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How to
Analyze Railroad
Reports

How to Analyze Railroad Reports

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PREFACE

For many years there has been a demand among bankers and investors for a popular but complete presentation of the proper principles for analyzing the reports of steam railroads. Many years ago an attempt was made by Mr. Thomas F. Woodlock, at that time editor of the "Wall Street Journal," to explain the methods then in general vogue by the railroads in presenting their operations and financial condition to their stockholders, and his little work ("The Anatomy of a Railroad Report") went through many editions, and was the only authoritative presentation of the subject which was available to the general public.

Since those days the methods of railroad accounting have been very largely changed, and, it must be agreed, vastly improved. The Uniform Requirements of the Interstate Commerce Commission have done much in recent years to simplify for the investor in railroad stocks and bonds, the meaning and significance of the various exhibits and accounts presented annually in the formal reports of the companies. The requirement that all railroad accounts shall be made up on a uniform plan, and that the various departments of the business shall be presented in proper detail, has made it possible for intelligent comparisons of results and methods to be made with respect to every railroad system in the country. Thus, the

proper analysis of the railroad report, with intelligent deductions made therefrom, is a distinct guide to the holder of the securities in judging the very important questions of intrinsic values as well as prospective change.

The principles outlined on the following pages, for analyzing railroad statistics, are the result of many years of study of the general subject of railroad operation, management and finance, and constitute the basis on which the much larger work, "Moody's Analyses of Railroad Investments," issued annually, has been built up.

J. M.

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INTRODUCTION

I

Preliminary Statement

The first question usually considered by one who contemplates investing money on a partnership basis in a business enterprise is the possibility of expansion in earning power. Few persons will knowingly place their funds, on such a basis, in any undertaking which is not currently earning a satisfactory return, and only a limited number will consider going into a paying business unless they are convinced that there are possibilities of growth and expansion ahead, in the amount of profits to be secured. The hope that his money, thus invested, will earn from year to year an increasing return, is usually the motive that induces a man to place his capital at risk on the same general basis that the active, or working, partner gives his time, his labor and the fruits of his training or experience.

The stockholder in any corporate undertaking is in precisely the same position as the investing partner. Whether the enterprise happens to be a steam railroad,

a gas or electric light company, a trolley line or a manufacturing plant, the key to the position of the holder of the shares will be the question of profits.

On the other hand, when a person loans funds to a business undertaking and receives some sort of security therefor, the primary fact for him to ascertain is not the amount of profits or the future prospects of the business but the value and character of the property which is given as security for the loan. In other words, he places his capital at work by loaning it, not to get the benefit of increasing earning power or to share in the future possibilities of growth and expansion of the business, but to insure himself a certain fixed return on his money, for a fixed period, and without regard to changes in the character or volume of the business, for the carrying on or development of which the money may have been borrowed.

The bondholder in the corporate undertaking is, strictly speaking, in this position. As the stockholder is the owner, the bondholder is the loaner. Just as the holder of the shares bears the position of investing or inactive partner, the bondholder stands in the same relation to the corporation as does the man who loans money on a piece of real estate on bond and mortgage or makes personal advances to another on satisfactory security or guaranty. The bondholder is the man who holds the "I O U" and is (theoretically) secured against loss; the stockholder is the sharer in both profits and losses.

Briefly stated, therefore, a share of stock in any kind

of corporation represents ownership of a part of that corporation's property. Thus, the man who buys a stock is in reality going into partnership with others, be those others many or few, and is assuming the general business risks which are naturally inherent in all partnerships. A bond, on the other hand, never represents ownership, but is simply a loan (or a portion of a loan), usually (but not always) secured on a stated piece of property. A person who buys a bond is not acquiring any actual ownership, but is merely loaning money to those who are the owners. If A invests a thousand dollars in New York Central stock and B invests a thousand dollars in New York Central first mortgage bonds, the A who is the owner (jointly with others) of the New York Central & Hudson River Railroad, is (jointly with others) borrowing one thousand dollars from B, who (jointly with others) agrees to loan money to the enterprise, and take as security a first lien on the property which A and his associates own.

But between the two generic types of corporate securities (mortgage bonds and plain stocks) there are other classes which partake more or less of the characteristics of both. This is particularly true in the vast field of a steam railroad securities. In the characteristics of stocks, the relationship to the partnership principle is qualified in many instances and degrees. Thus we find that many stock issues are "preferred" as to position or interest in the undertaking. This preference is sometimes limited to a prior claim on the earning power or profits; in other instances it covers also the tangible

assets of the corporation in the event of liquidation; and in still other cases it embraces also the voting power, preferred holders sometimes having a voting privilege to the exclusion of the other stockholders. An example of this is shown in the case of the Rock Island Company, where the preferred stockholders possess the right to elect a majority of the board of directors. In like manner, there are instances where the voting privilege is withheld from preferred shareholders in consideration of the preference granted them for a prior division of or claim on income; and ordinarily they also forego all claim on further profits beyond the fixed amount for which they have preference before any dividends are paid on any other classes of stock. In this limitation of income the preferred stock partakes of one of the characteristics of the ordinary bond.

In still other instances the preferred stock is given a lien on the property similar to that of a mortgage bond, and there are cases existing where stock issues are secured jointly with bond issues and where stock issues have a prior lien over certain bonds. Some preferred stock issues share with the common stocks in further dividend disbursements after their own fixed amount of dividend has been paid. A case in point is that of the Chicago & North Western Railway. Here we find that the preferred stock has prior right to 7 per cent per annum, after which the common stock is to receive 7 per cent. Then the preferred has a further preference to 3 per cent; then the common is entitled to 3 per cent more, after receiving which both classes of

stock share pro rata in any further division of profits which may occur within the year. Many other examples might be given of similar provisions.

Thus it will be seen that the varying terms in stock issues of railroads and other corporations have a tendency to qualify the shareholder's position as a plain business partner. The preferred shareholder, while still being bound up as one of the owners of the enterprise, is accorded a prior claim on income or on assets, in consideration of agreeing to be content with only a fixed amount of the profits per year, and allowing the other partners to divide up the balance. He therefore holds a dual position, and, while one of the owners of the property, as every shareholder is an owner, he at the same time holds a prior claim on the income as the loaner or bondholder does.

But while the preferred stockholder enjoys the benefits of this prior claim on income or assets, he is still a stockholder only and his claim relates only to what surplus income or assets may remain over after the rights of all bondholders have been satisfied. In brief, while his position is superior to that of the common stockholder or ordinary partner, his preference is entirely subsequent to that of the loaners or bondholders.

The characteristics of bond issues also vary so largely that the position of the bondholder is often shifted to that of limited partner, or both partner and creditor. There are many railroad bond issues which provide for voting power under certain conditions; there are others which receive their interest only when currently earned

by the corporation; there are still others which participate jointly with stock issues in division of certain income, while, of course, there are numerous classes of mortgages, from first mortgage down, which, in one way or another, qualify or limit the position and security of the particular issue and its claim on income. Instances of bond issues carrying voting power are the Erie Railroad prior lien and general lien 4s, each one thousand dollar bond being entitled to ten votes; this being equal to the voting power on ten shares of stock of the par value of one hundred dollars each. The three issues of Preference Incomes of the Central of Georgia Railway are examples of bond issues which, while being directly secured by mortgage, at the same time receive interest only when earned by the company and distributed in the discretion of the board of directors.

The point which it is desired to emphasize by the foregoing statement of simple facts, is that while bond and stock issues of corporate undertakings represent, technically, two absolutely distinct classes of obligations, yet through qualification of terms and modification of original forms, these two great classes of securities so blend and interlace in modern corporate finance, that their values as investments must be ascertained largely by the same methods of analysis. Many bond issues which are secured by direct first mortgage are in every sense less secure and, therefore, less valuable than many stock issues are, while some mortgages which are secured by a fourth or fifth lien on certain railroads are far more attractive as investments than many others which have

no prior liens ahead of them. Thus the Reading Company general 4s, secured by collateral and a junior mortgage on the main lines of the Philadelphia & Reading Railway, are in every way, more desirable than such issues as the Lake Erie & Western Railroad first 5s, which have no liens whatever ahead of them.

And to carry the illustration a little further, the two large issues of Lake Shore & Michigan Southern debenture 4s, not secured by mortgage at all, and being merely promises to pay, like the ordinary note, are at least equal, as safe and conservative investments, to the Southern Railway first consolidated 5s, which are a first mortgage on over nine hundred miles of road, and secured in addition, subject to prior liens, on over three thousand four hundred miles more. The Atchison convertible 4s, the Norfolk & Western convertible 4s, and the Union Pacific convertible 4s, none of which have any mortgage lien whatever, are regarded as stronger, independently of the special attractiveness of the "convertible" privilege, than issues like the Toledo, St. Louis & Western prior lien 4s or the Denver & Rio Grande first mortgage 4s.

While, in the abstract, the value of a mortgage bond depends on the value of the property back of it, and this is, as already pointed out, the first primary question to be determined by the prospective bond investor, still as a matter of practice in the great majority of cases the vital questions of income results and possibilities of future growth and expansion in the property must come in for full consideration, just as they must in the cases

of analyzing the ordinary stock issues. In railroads, above all other classes of enterprise, the basis of value is the earning power. Money is loaned on realty or other specific security in more liberal amount and on better terms to the borrower in some cases than in others, the consideration that the borrower is a successful business man, making progress, with probably a good future ahead, adding to his credit and being regarded in itself as increasing the security of the loan. Precisely the same principles apply when a great railroad or other corporation is seeking loanable funds, and the Pennsylvania Railroad can, on its simple promise to pay, borrow many millions on better and closer terms than can the Missouri Pacific borrow a trivial amount even when putting back of the loan property of admittedly greater value than the amount of the loan itself. Briefly, it is much easier to borrow on good terms, whether the case be that of an individual or a corporation, if your past record and prospects of growth and stability are good, than it is if your record is bad or your prospects are uncertain.

It will be clearly seen, therefore, that in any analysis for ascertaining the values of either high-grade or inferior securities, *the earning capacity of the property represented must be weighed and considered in advance of everything else.*

The Railroad: Its Normal State

The question of earning power applies with peculiar force to the steam railroad corporation. In the railroad we have a type of property which is essentially distinctive and unlike other business undertakings. The value of the railroad does not depend mainly and primarily on its length or location, its volume of business, capital invested or the appraised worth of its tangible property. While these matters must come in for due consideration, they are not the primary factors. The property owned by a railroad company is not like that owned by a realty company, a department store or an ordinary manufacturing concern. A realty company can stop business and still retain the value of its assets; a manufacturing concern can shut down for extended periods and still retain the bulk of its value more or less intact; a department store can move its business or change its policy or methods and may run but slight risk of loss. Also, the owner of a patent, a corner lot, or the holder of a tract of coal or ore deposits, can stop business and go to foreign lands, and the value of his property may keep on increasing, year after year. But not so the railroad. The normal condition of the rail-

road is that of motion, not rest. A railroad which stopped running its cars would soon find its assets shrinking to nominal figures, and while it might own valuable terminals and rights of way, yet their chief value is usually bound up in their use as a railroad route and for railroad purposes. It is often said that the terminal properties in great cities owned by the modern railroads are assets of vast and steadily increasing value, as they give the roads advantageous entrances into rapidly growing centres of population in all parts of the country. This is true, but the fact must not be overlooked that in relation to the capitalized values of the railroads themselves, as reflected by issues of stocks and bonds, the terminal and other tangible realty values owned by the railroads are but a small proportion of the whole. The wonderful Pennsylvania terminals in and about New York City are probably worth upward of \$150,000,000, and will rise steadily in value as New York City expands in population. But to the Pennsylvania Railroad Company, or to anybody else, they are mainly valuable in the use to which they are put as a part of the railroad system. Abandoned for transportation uses the tunnels would be worthless, and the realty would simply retain the normal value given it by the presence and movement of population.

When it is once clearly realized that railroad property is normally and essentially *property in motion* and that its value depends primarily on facts connected with never-ceasing action, the starting point has been reached for an analysis of railroad securities. But it is difficult

for the untrained mind to picture to itself the far-reaching meaning of this normal condition of motion. We place before our eyes a map of the amazing net of railroad lines stretching over the vast expanse of the continent, and crossing, recrossing, and interlacing in the more populous sections until the maze is so intertwined and close that the entire surface seems to be covered with railroad tracks. We read statistics of the vast mileage of these railroad systems; how companies within single States own or control trackage enough to stretch from New York to San Francisco and return. We see reports of the many millions invested in rights of way, in structures and bridges, in equipment and in terminals. We learn of the great tonnage capacity of modern freight cars and the wonderful speed of passenger trains, annihilating time and space and bringing distant communities into the closest commercial touch with each other. All these specific things we understand and they appeal to our imagination, but it is not so easy to realize the financial significance of the aggregate motion and wear and tear which are ceaselessly going on, daily, throughout the year and the decade, without beginning and without end. One pictures in the mind a great waterway like the Mississippi, but fails to realize its never-ceasing motion, and that each day sees a renewal of the vast waters that through the ages have been flowing to the sea. So one forgets that the very life and existence of the vast railway net (and consequently its value) is bound up with the moving daily and hourly, of hundreds and thousands of trains, laden with goods and passengers, the aggregate tonnage,

and numbers of which daily run into the millions. While nearly 20 per cent of all the able-bodied men in the United States are engaged, year in and year out, in operating this vast industry of railroading, a very much larger number of the entire population of the country are constantly being transported from point to point on these trains. And of the vast products of the mines and the mills, of the farms and grazing and agricultural regions, as well as manufactured goods of every kind, the railroads have daily in their possession, as carriers, a fabulous total.

In fact, properly to picture in the mind the railroad and its function, we must picture, practically, a whole nation, not fixed or in repose, but in constant motion, its population moving by the million, from hour to hour and from day to day, and its wealth, in vast aggregates, being shifted from point to point and back again, the goods moved to-day being replaced to-morrow in equal or greater volume, just as the waters of the rivers which are to-day emptied into the Gulf are replaced in never-ending flow by new waters from the North. Should the sources of the rivers suddenly give out, almost in a day the great waterways would disappear. And in the same way, should the railroads cease to move their trains, even for a day, their value, and consequently the value of their securities, would enormously depreciate. The entire fabric of commerce, of wealth production and of consumption would be broken down, and disaster would follow for the country and the railroads alike.

Enough has been said to intimate not only that to

analyze railroad security values we must approach the subject from the operating side, but also that the question of railroad operation is closely bound up with the commercial, industrial, and social life of the nation itself. Without the business and social activities of the people the railroads would be worthless; while without the railroads and their efficiency of operation, there could be no such thing, in the modern sense, as commercial and social activities at all. As the modern world could not get on without money and credit systems, in an equally true sense it could not get on without the railroads.

We can carry this analogy further. With crude systems of banking and credit, we can do something; and with incomplete or crudely operated railroads we can do something. But just as the possibilities for the promotion of national prosperity are conserved and promoted by sound and efficient methods of credit, so are they aided and developed by efficient and progressive methods of railroad operation. With the inefficiency of the railroads of fifty years ago, even though they stretched over the entire continent and represented as much mileage as they do to-day, we could probably not transport over their lines more than 20 per cent of the passengers and goods that we now transport; and where the railroads of the country to-day show a net earning power of \$4,400 per mile, under such conditions they would probably not be able to earn more than \$1,000 per mile.

The broad vital question, then, alike in railroading as in banking and the mechanism of exchange, is not the size of the business, nor the volume of capital in-

volved, but the interior or intensive development and perfection—the *efficiency* of developed means for carrying on the function with a view to attaining the best results.

III

First Steps in the Analysis

The connection of the railroads with general conditions in commercial and industrial fields is so close that first of all an examination must be made of the character of territory through which a railroad system runs, and the trend of population over extended periods in that territory must also be given due consideration. The plan followed for the analysis of the different railroad systems by "Moody's Analyses of Railroad Investments,"* adopts this point of view. An examination of the different statements in that publication will show that the first subject taken up in each case is that of "Location."

In a growing country like the United States, where population is almost constantly increasing, and where there is a large amount of shifting in population and steady changes in the types of business and agricultural localities, the question of geographical characteristics is

* "Moody's Analyses of Railroad Investments," by John Moody, contains in detailed form an expert comparative analysis of each of the railroad systems in the United States and Canada, with careful deductions, enabling the Banker or Investor to ascertain the true values of securities by a method based on scientific principles. The book is issued annually at \$12 per copy or \$12.50 delivered. Analyses Publishing Co., 25 Nassau Street, New York.

of far-reaching importance in judging or estimating, from the investor's point of view, the strength or weakness of a railroad property. For example, take the territory covered by the modern Atchison, Topeka & Santa Fé Railway system. This property consists of over 11,000 miles of railroad, embracing a trans-continental trunk line, extending from Chicago, Illinois, to Los Angeles and San Francisco, California, with important branches to such points as Galveston, Denver, and El Paso. It enters and crosses Illinois, Missouri, Kansas, Colorado, Oklahoma, Texas, New Mexico, Arizona and California. This is an enormous stretch of territory and suggests extremely diversified sources of income. A portion of the mileage extends throughout the fairly well settled sections of Illinois, Missouri and Kansas; other parts penetrate the vast agricultural regions west of the Missouri and east of the Rockies, extending far south to the borders of the Rio Grande. Further to the West the lines enter the arid regions of Arizona and New Mexico, beyond which the road crosses the mountain ranges and traverses nearly the whole State of California, up through the great San Joaquin Valley to San Francisco and, with allied lines, beyond to the north.

This vast territory with its diverse characteristics, at once indicates that the Atchison system is clearly not dependent for its prosperity on any single line of industry, nor for its freight traffic upon any single type of tonnage. It also implies that different parts of the system are subject to different local conditions and are affected in an operating sense by many different factors.

The fact that the railroad system crosses many States indicates that it is subject to the diverse legislation of those States. Thus, while the legislation in the State of Illinois may not be inimical to the interests of the railroad, that of the State of California may. It will also be apparent that, while the diverse territory through which the system penetrates brings in many factors of local nature to affect the earning power, yet the fact that the system constitutes a trans-continental or through line connecting two great commercial sections emphasizes the importance of through traffic in both passengers and freight. Analysis would clearly show that without its through business and connections with the East for carrying on economically an enormous long-haul traffic in both directions, the Atchison system would not be able to earn its dividends. Therefore, considered as a whole, it will be apparent that the through business of the Atchison is a very vital factor.

So much for the condition of the territory as it exists to-day. But to know the trend of population and the rapidity of growth in the population in a given territory, is of equal importance with a knowledge of its present condition. Therefore, it is necessary for the student of railroad security values to examine the population records over a series of years. It is difficult in this country to secure exact figures along this line except once in a decade, but within the past few years many of the States have been making a yearly census of a more or less complete nature, which results in giving a fairly accurate idea of the movement of population. In "Moody's Analyses" the plan is followed of going back as far as 1890

in the records of population, and presenting in each case the figures of the territory under review, first for 1890, then for 1900, and finally for 1910. By comparing these figures it will be seen that a sufficiently accurate idea can be secured of the relative changes in population within a twenty year period to make the comparison comprehensive and intelligent.

It will be understood that such figures of population are not absolutely accurate indicators of the fields served by the particular railroads, as some roads, of course, serve a very minor proportion of a given State, but the idea should be to ascertain as closely as possible the relative growth of sections in which the roads have a reasonable amount of mileage. Thus, where a railroad simply crosses a corner of a State, or has within the State a very small amount of mileage, the population of that State should not be embraced in the comparison. Where a railroad crosses an entire State or penetrates far into it, reaching commercial centres of importance, the population of that State should always be considered.

The great value of these comparative population figures may be well emphasized by a few examples. Thus, to examine the New York Central's operating territory. We find that from 1890 to 1910 the changes in population in New York State have been pronounced. In 1890 the population of the State was 5,997,853. In 1900, a decade later, the number had grown to 7,268,894, while in 1910 the figures given were 9,113,614. These figures of course imply that there has been a pronounced growth in both wealth and general industry in the New

York Central's territory since 1900. They show that while, during the decade from 1890 to 1900, the growth in population was only 1,271,041, or about 21 per cent, during the last ten years the growth has been 1,844,720, or over 25 per cent, indicating a more pronounced upward trend since 1900, than prior to that date.

The same principle should be applied to railroads in all sections of the country. While in the Eastern States the trend of increase in population is less pronounced than in the far Western States, yet it has an equal effect over long periods in connection with conditions of railroad properties. If we examine the territory of the Chesapeake & Ohio system, the trend in which is reflected by the population figures of Virginia, West Virginia, and Kentucky, we shall find that during the past ten years, within which time the business of the Chesapeake & Ohio Railway has been growing by leaps and bounds, the population in this section has increased nearly 30 per cent over the census figures of 1900. Considering these figures in connection with the history of the Chesapeake & Ohio Railway, it will be remembered that the lean years of the Chesapeake & Ohio occurred within the decade when the trend of population was only slightly upward, while during the period which has followed, in which the material growth of the section has been so marked, the road has reached a position of high credit and has become one of the big money makers in the railroad field in this country.

To take another example, we might examine the figures of population for the State of Iowa, in connection

with the operations of properties like the Iowa Central Railway. Here we find that according to the record the population of the State of Iowa has grown less than 10 per cent since 1900, and that the increase during the past ten years has been less than was the increase for the decade following 1890. The effect of this slow growth is reflected in the results of those railroads the mileage of which is mainly confined to the State of Iowa. The mileage of the Iowa Central Railway is largely so confined, and if we examine the operating results of this road for the past ten years we will find that the trend of growth, in both volume of business and in profits, has been extremely moderate. While its business is larger than it was ten years ago, the increase has been so small as compared to that of roads in other and more diversified territory, that the relative connection of population and railroad growth is strongly emphasized.

The vast majority of American railroad systems have prospered greatly within the past decade and have been benefited to great extent by the rapid upward trend in population and consequent increase in commercial and industrial activities. It is only here and there that we find a setback or a state of stagnation in population, although, of course, some centres and sections have shown a far greater relative increase than others. For example, the territory covered by the Erie Railroad has grown in population about 17 per cent since 1900; that of the Great Northern has grown over 50 per cent; the Illinois Central territory has grown about 15 per cent; that of the Kansas City Southern about 25 per cent; that of the

New Haven about 12 per cent; while the territory covered by the Pennsylvania Railroad operated lines has increased in population over 18 per cent. It will be realized, of course, that territory covered by Western railroads has increased in population in far greater ratio than has that covered by railroads in the East. Some sections of the South have also shown unusually rapid expansion since 1900.

Having ascertained by careful examination the population and its trend over a generation within the territory penetrated or fed by a railroad system, we are then in position to turn to some of the physical characteristics of the railroad property itself. But before doing this it is well for the investor to analyze in some detail the wealth and population totals which he has secured. By slight effort he can always secure from the United State Census Bureau, or other sources, the details of population and wealth, showing what the wealth and population consist of and where the special growth is tending. For example, if he were interested in a railroad system like the Colorado & Southern, the fact that the wealth development and census growth of Colorado were chiefly centered about the terminals and lines of the Colorado & Southern system, would be a matter of vital importance to him. On the other hand, if he were interested in a line confined to another section of the State of Colorado, with little opportunity for commercial intercourse with Denver, then the prosperity of the latter place would not be of most importance to him.

The census bureau records can also be profitably ex-

amined to learn of the changing characteristics in given territories, such as agricultural and other developments. The enormous sums now being spent by National and State governments in the irrigation of the arid regions of the West, are of real significance and meaning to the holder or the prospective buyer of the securities of railroads in those sections. Another decade of irrigating development in this territory will cause many changes in industry and in population and consequently in railroad tonnage and profits. Such facts as these and others along the line of manufacturing growth, development of waterways, opening of natural resources, and settlement of public lands, are all of intense interest and importance to investors in railroad shares and bonds, and should not be overlooked in any careful examination of the railroad and its earning power.

Starting with this general geographical knowledge of the section which the railroad penetrates, we can now turn with safety to the railroad itself and examine its report with intelligence, and analyze its securities with reasonable safety.

IV

The Location of the Railroad

The three chief elements to be studied in analyzing railroad reports are the *Physical Factors*, the *Income Factors*, and the financial or *Capitalization Factors*. The physical factors or characteristics embrace everything of a physical nature, such as the mileage and location of the road, the equipment owned and used by the road, the character of tonnage transported on the railroad, the methods of handling the tonnage and passengers on the railroad, the efficiency of operation of the trains of the railroad, and the average rates received per person and per ton for transportation services performed by the railroad. Every railroad report embraces figures which to more or less extent show these physical characteristics. Moreover, each railroad in the United States doing an interstate business is required to file full, complete and uniform records of its entire business, physical, operating and financial, with the Interstate Commerce Commission.*

But independently of the requirements of the Commission most of the railroads furnish their stockholders with quite complete figures covering the physical sides of their properties. Usually the railroad report begins

* See appendix for detailed explanation of the Uniform Requirements of the Interstate Commerce Commission.

with a statement, in condensed form, of the mileage operated. This statement of "mileage operated" indicates the *average* number of miles of main track operated within a single year, as well as the total at the end of the year, and is usually sufficiently elaborate to show in detail the entire mileage of the system, indicating where this mileage is located and what points it reaches, showing the number of extra main tracks and their mileage, and also the mileage of yard tracks, switches and sidings. Most railroad corporations also present with their annual reports a complete map of the entire railroad system, enabling the stock or bond-holder to see at a glance just where the railroad runs, what cities it enters, what connections it has with other lines, and what the general character and type of territory are in which it is located. The map is naturally the first thing to be examined in connection with the mileage and the operation of the property.

The majority of railroad reports are so arranged that, following a statement of the mileage operated, a statement of earnings, or a condensed income account, is presented. But to examine the report systematically and scientifically, the location of the road and its mileage should be immediately followed up by an examination of the nature of the tonnage which is transported on the property. The character of the tonnage has direct relationship to the location of the property, and to the type of territory. In other words, railroads are directly dependent for their prosperity on the particular industries which are dominant in the territories through which they

run, and the prosperity of those industries and their general stability are at the base of the success of the railroad itself. So we find that a railroad like the Bangor & Aroostook in Maine is largely dependent on the lumber industry in that State; the Boston & Maine and Maine Central are dependent on diversified local traffic, their through business being a factor of minor importance. The New Haven is more largely dependent for its success on the maintenance of passenger rates than it is on the maintenance of freight rates, as passenger business predominates and is a large source of revenue. The Reading, New Jersey Central, and Lehigh Valley are dependent largely upon stable conditions in the anthracite coal fields, and a large part of their value is bound up in their control, direct or indirect, of these great coal deposits. The Chesapeake & Ohio, the Norfolk & Western, the Hocking Valley, the Buffalo, Rochester & Pittsburg, and to an extent the Baltimore & Ohio, Lake Shore, and Pennsylvania are dependent upon conditions in the soft-coal industry. Properties like the St. Paul, the Chicago, Burlington & Quincy, the Rock Island and the Missouri Pacific, are more or less bound up with the agricultural conditions in the territories through which they run. In the event of crop failures or short crops, their earnings are vitally affected, while, on the other hand, in years of "bumper" crops they all prosper to unusual extent. In the same way, properties like the Southern Railway, the Atlantic Coast Line, the Louisville & Nashville, and the St. Louis Southwestern are dependent to a large extent on such crops as cotton, and their

prosperity is bound up with that of this type of industry. In addition to this there are other railroads which derive a large proportion of their traffic from the products of iron, copper and other mining centres, and the prosperity of these industries affects their earnings vitally.

In view of the foregoing facts, it will be seen that a definite knowledge of the nature and character of tonnage transported by the railroad is a matter of great importance to the owner of the shares or bonds. In "Moody's Analyses" these tonnage figures are given proper prominence and wherever possible a comparison of the tonnage percentages for the entire decade, closing with the last fiscal year, has been presented. In this way the user of the book can see at a glance the changes, if any, which have taken place during the period under review.

Most of the railroads long ago adopted a uniform classification for their freight traffic, and most of the railroad reports present the classification in tons in the uniform way required by the Interstate Commerce Commission. This classification is divided as follows:

1st: Products of agriculture, embracing such things as grain, flour, cotton, tobacco, hay, fruit and vegetables, mill products, etc.

2d: Products of animals, embracing live stock, dressed meats, hides and leather, poultry and game, wool, packing-house products, etc.

3d: Products of mines, embracing anthracite and bituminous coal, coke, ores, stone, sand and similar articles.

4th: Products of forests, embracing lumber and all allied products.

5th: Manufactures.

6th: Merchandise and miscellaneous articles.

There is a very wide diversification in the character of the tonnage transported by the different railroads, and the great dependence of some systems on particular articles for their tonnage is well brought out by an examination of the Freight Classification Statistics. It will be seen, for instance, that, of the total tonnage reported in 1910 by the Lake Shore & Michigan Southern Railway, about 60 per cent represented products of mines; on the New York Central in 1910, 47 per cent represented products of mines; on the Lake Erie & Western 80 per cent was so represented, while on the Lehigh Valley about 63 per cent was anthracite coal. Turning to Western properties, we find that the Missouri Pacific, in 1910, depended to the extent of 19 per cent on agriculture for its tonnage and 22 per cent on forest products. The Missouri, Kansas & Texas reported 37 per cent in mining products, and 21 per cent in products of agriculture.

The more diversified the tonnage of a railroad and the less dependent it happens to be on any one or two types of industry, the stronger and more stable its traffic is apt to be. Thus the New England properties, like the New Haven and the Boston & Maine, on which the freight tonnage is unusually well diversified, can be expected to make a more satisfactory showing of stability, in good times and in bad, than can those railroads where the traffic is not so well diversified. The Boston & Maine in 1911 reported its products of mines at 25 per cent as the highest single class of tonnage, and its mining classification was itself well diversified. The same fact is true in relation to the Atchison reports of recent years.

That this matter of tonnage characteristics is a most vital one for the investor to consider is well demonstrated by the past records of some of the railroad systems. In the '80s and early '90s the Philadelphia & Reading Railway, the New Jersey Central and other properties in the hard-coal section all went into bankruptcy or approached very near to it, largely as a result of disturbed conditions in the anthracite coal fields. In those days, although many attempts were made to maintain the prices of coal and the rates for the transportation of the product, little success was attained, and the outcome was that disastrous price wars and generally disturbed conditions broke out incessantly. Finally, after the depressed period from 1893 to 1897, the coal-carrying roads were generally reorganized and, through direct or indirect control of the anthracite deposits, they were enabled to form a strong alliance for the protection of rates, and since that period have enjoyed unexampled prosperity. Should, however, open competition break out anew among the coal-carrying roads, or should labor or other local conditions in the anthracite fields become radically unsettled, the Reading Company would feel its effect in earning power more quickly and to more pronounced extent than any other system in the country. In the same way, the soft-coal properties, such as the Chesapeake & Ohio, the Norfolk & Western, and the Hocking Valley all went into the hands of the courts at different times, as a result of unsettled conditions in the soft-coal business in their respective territories, the security holders suffering

in large degree and being obliged ultimately to make heavy sacrifices.

Applying the illustration to the great grain-carrying roads of the West, commonly known as the "Granger" lines, we find that crop failures or crop shortages have in the past affected the earning power, and, therefore, the standing of their securities, to enormous extent. In the early '90s, roads like the St. Paul, the Burlington and the Rock Island, which were the leading "Granger" roads, extending throughout the States of Iowa, Kansas, Nebraska and Minnesota, were more dependent on the crops for their tonnage than any other railroads in the country. Consequently, when the depression of 1893 and the following years arrived, these roads all showed enormous losses in income, and the value of their securities shrank to little more than half that of a few years before. The common stock of St. Paul, which had sold above par and paid dividends for years, declined to less than \$50 a share and for several years paid no dividends at all. Its bond issues, which had for some years sold on high investment planes, dropped into the class of semi-speculative securities and for a long period sold on bases of return far below the issues of equal position and security on properties like the New York Central, the Louisville & Nashville, and the Illinois Central. Burlington stock at the same time sold below \$60 per share and for a time paid little or nothing, while Rock Island stock reached lower figures than any of the others. Still other properties of heavier capital and less relative financial strength, like the Northern Pacific, the Union Pa-

cific, and the Atchison, though dependent on grain traffic to less degree, broke down completely and were entirely reorganized; a large part of their bankrupt condition being brought on as a direct outcome of the prolonged crop failures.

On the other hand, we find that where railroads had the benefit of a well-diversified traffic during the period referred to, although the far-reaching depression of those years had a naturally depressing influence on their earnings, they, as a rule, came through without depreciation or disaster. Where disaster did occur on a railroad with diversified traffic in the '90s, it was generally due to other causes. These causes, in cases like that of the Southern Railway, the Erie, and a few others, were largely involved in financial questions and in generally poor management. No trouble was found by properties like the New York, New Haven & Hartford, the New York Central and the Illinois Central, or even the Denver & Rio Grande in going through the disastrous period of depression without default.

A large element in the strength of the modern "Grangers," such as the Great Northern, the Burlington, and the Chicago & North Western lies in the fact that of recent years their traffic has become more diversified than was the case fifteen or twenty years ago. In the year 1891, the tonnage of the St. Paul was made up to the extent of nearly 50 per cent in agricultural products. But by the year 1899 agricultural products constituted but 32 per cent of the total tonnage, while in 1910 the proportion had been reduced to 19 per cent. On the

Atchison a similar trend is shown, and agricultural products, which in 1910 constituted but 21 per cent of the total tonnage, embraced a far heavier proportion twenty years ago.

Some railroads of great financial strength, such as the Lake Shore, the Pennsylvania, and the Baltimore & Ohio, still depend very largely on the products of mines (chiefly coal) for their tonnage. But in view of the character of territory through which they run, and the conservative financial position in which they have been for a long series of years, this fact is not of such dominant importance as in the case of railroads which are more heavily capitalized in relation to their volume of business, and which are generally operating on a narrower margin.

Examples of the effect of crop shortages on the revenues of crop-carrying roads are shown in the results of the Northern Pacific, the St. Paul, the Minneapolis, St. Paul & Sault Ste. Marie, and, to a lesser extent, the Chicago & North Western during the fiscal year 1911. All these roads reported sharp declines in freight traffic income, as well as in general net results. For it must not be overlooked that when a crop failure or shortage overtakes a given territory, the railroad feels it through the falling off in general business activity in that section, as well as in the lighter grain tonnage. Indeed, the most adverse effects are usually felt months after the crops have been harvested and transported.

Another point to be considered in the examination of the railroad before leaving the general subject of Location, is that of the length of lines and the geographical size

of the property as a whole. It will be realized that, even where everything else is equal, the size of a railroad has much to do with its general strength. A short line, even if enjoying diversified traffic of a very satisfactory nature, is at a disadvantage as compared to a system of several thousand miles which enters many large cities, has numerous alliances and connections with other lines, and covers larger stretches of territory. An example of this is brought out by the record in recent years of the Louisville, Henderson & St. Louis Railway, a small system of 200 miles which extends from Louisville to Henderson, Kentucky, forming a portion of the Louisville & Nashville system, but operated by its own organization. On this line the traffic is well diversified and the business has grown steadily but moderately for some years. The capital involved, however, is small and the volume of business comparatively light, and although the charges on the property under normal conditions were usually being earned nearly twice over, yet an important item of expense in the nature of rebuilding a bridge lost by a wash-out in 1906 had the result of greatly increasing the operating costs and consuming the surplus to such pronounced extent that in 1908 the road failed to earn its charges. In this particular case the integrity of the property and its securities were protected by the close alliance with the Louisville & Nashville system, but had it been an independent road, relying on its own resources alone, its credit might have fallen to a very low level.

A large railroad property, however, with much mileage and consequently larger capital, could withstand

experiences of this nature without feeling them to any important degree, and would, of course, be in a much stronger position at all times to bear the brunt of any local set-backs which might occur on different parts of its lines. The depression in 1908 in the lumber industry in the far Southwest cut the business of the small Gulf & Ship Island Railroad more than half in two, but the St. Louis Southwestern property, which also depends largely on the lumber industry in that section, did not reflect in its income anything like the same reverse. So also properties like the Iowa Central and Minneapolis & St. Louis,* which are confined within single States or limited districts, in spite of the fact that they enjoy at the present time a fairly well diversified traffic, cannot make as good a showing when a depression overtakes the country, such as that of 1910 and 1911, as can roads like the St. Paul, the Great Northern, and the Union Pacific.

Therefore, in considering the relative positions of different railroad companies, the length of track, as well as the characteristics of the territory covered and the type of tonnage carried, is a matter of vital importance. Superiority in these respects does much to put systems like the Atchison, the Baltimore & Ohio, the Canadian Pacific, the Great Northern, the Missouri, Kansas & Texas, the Northern Pacific, the Pennsylvania, the Southern Railway, the Union Pacific and the Southern Pacific in a more desirable investment position than properties

* These two properties have now been consolidated; a change which should obviously strengthen their financial and operating position, other influences aside.

like the Chicago Great Western, the Toledo, St. Louis & Western, or the Mobile & Ohio. One of the elements of strength in the Southern Railway property which has enabled it to present a good record in recent years has been the fact that the system is of wide extent and penetrates much territory. The Toledo, Peoria & Western, confined to a small section, may make a fair showing in good times, but fails to earn its charges in poor times; the Lake Erie & Western and the Cincinnati, Hamilton & Dayton, confined within a narrow range for their business, have been at a disadvantage to meet periods of depression, entirely aside from the matter of diversity of tonnage.

V

The Management of the Railroad

Of equal importance with the geographical location of a railroad property and the physical facts which grow out of that location, is the question of control or management. As position and credit among individuals is based largely on reputation for ability and past good records, so also the credit of a railroad property, other things aside, is better where that property is in the hands of men of acknowledged ability, integrity, and financial strength than where the reverse is true. It is a matter of far-reaching meaning to know whether a property is under the control of railroad builders or railroad speculators; to know whether the men at the head of the system are bent chiefly on operating it for the benefit of the real owners or for the benefit of themselves. In the days of Fisk and Jay Gould the Erie road had little or no credit; its volume of business grew as its territory grew in population, but the management was engaged in making it a football for speculation and not a well-operated and soundly financed business. While these conditions lasted and the standing of the property went from bad to worse, other railroads of like physical character, such as the Pennsylvania and the New York Central, were being man-

aged with ability as business enterprises and were steadily building up their financial and operating strength, the fruits of which they have enjoyed in subsequent years. The Cincinnati, Hamilton & Dayton, poorly managed for twenty or thirty years, was finally wrecked under bad financial and operating management, but under the more efficient management of the present interests, is showing operating results which are superior to any in the past history of the company.

We have numerous current illustrations of the direct influence on a railroad of the character of control. Where men have established a reputation for superior ability in railroad operation, as did Mr. E. H. Harriman, the entry into control of a property by such men immediately affects the position and strength of the property, entirely regardless of other considerations. Thus we saw that when, within the past few years, the Colorado & Southern property changed hands and went under the control of the Hill interests, the value of its securities at once rose to a higher plane than they had ever reached before. This change in control did not imply that the earning capacity of the Colorado & Southern would materially improve in the near future; it did not mean that the territory through which the Colorado & Southern runs would necessarily create more traffic for the road under the new management; nor did it imply that the operating management or the general maintenance of the property would be any better than they had been during the previous few years. For no fault could be found in what had transpired under the old management of the Colorado & Southern since

they came into control a dozen years ago. The company had been conservative in its financial policy; it had properly conserved its resources and not paid out too much money in dividends; it had set aside sufficient sums for maintenance, and had employed substantial amounts of surplus earnings from year to year in the general betterment of the property. But the fact that it had now become an integral part of the great Hill lines, under the dominant control of Mr. Hill and his associates, had a favorable influence of a pronounced nature. In other words, the record of Mr. Hill as a railroad manager of great success over a long series of years, is regarded as an asset of unusual significance and this opinion was immediately reflected in the rise in the value of the securities of the road. Mr. Harriman's entry in 1908 into the Erie Railroad had much to do with saving that property for the time being from financial disaster, and his election as a director in the New York Central had much meaning to the holders of securities in that property.

Therefore, it is of great value to know something about the personnel of those who are the responsible heads of the railroad, and the statement of management given in each railroad's report should always be carefully studied. These statements always embrace a full list of the officers and directors and in many cases full lists of the operating officials are furnished. Little trouble will be found in analyzing the significance of these names. Not only do they show managerial strength or weakness, as the case may be, but the general in-

tercorporate relationships with other properties are indicated in this way. While many railroads have no alliances with other lines, in the technical sense, owning perhaps no securities to represent connection and control, yet the personnel of the directorate may be duplicated in many cases. Thus we find that men who are officers and directors in some Eastern railroad may also be officially connected with and influential in the management of other roads in other sections of the country, thus showing a connection entirely independent of that reflected by ownership of securities, lease or other control.

But the alliances of this nature are in most cases also reflected by stock or bond holdings of one railroad by another. The intercorporate relationships so brought about are of a far-reaching nature and of great significance. For example, the Pennsylvania Railroad not only controls numerous lines which are separately operated and which are classed under the general head of the "Pennsylvania System," but it has important stock interests and, therefore, some voice in the control or policy of a large number of other important railroad companies. Among these may be mentioned the Baltimore & Ohio system, the New York, New Haven & Hartford system, and the Reading. The Baltimore & Ohio, on the other hand, itself has stock interests of importance in the Reading Company and, therefore, in the New Jersey Central system. The Baltimore & Ohio is itself largely owned by the Union Pacific interests, who also have a controlling interest in the Illinois Central and large stock holdings in

the New York Central. In fact, nearly all the great railroad lines hold interests of some amount in other large systems, in addition to the holdings represented by control of many so-called subsidiary properties. This has resulted in segregating the railroad mileage of the country, in a broad sense, into a few enormous groups, and the final question of managerial policy is traced to the personnel of these groups. So we find that the roads in which Mr. Harriman was vitally interested, have been, in a general way, referred to as the Harriman group, and in the managerial policy of these roads the Harriman influence was assumed to be dominant. The so-called Hawley group was made up of a number of officially independent systems covering great stretches of territory and understood to be subject to the same general financial and operating policy. The Morgan roads, prominent among which, at the present time, are the Southern Railway and the Erie, are judged by the character of their control, while the Hill lines are classed together also, and other systems, such as the Lackawanna and the St. Paul, have been regarded as Rockefeller properties.

But the field of management in the modern railroads leads us even beyond the matter of corporate alliances and control. It leads to the question of "friendships" among the railroad companies. Thirty years ago the problem of railroad relationships was very different from that of to-day. Then the railroad territory, particularly in the West, was wide, and the field for extensions was almost unlimited. There were no fierce contests for ter-

ritory, and in the construction of new lines the concern which got there first usually retained the undisputed control of the field. But in recent years there have been contests of a severe nature between great railroad corporations for exclusive rights in particular places. Sometimes these questions have been over terminal privileges; sometimes they have related to the question of opening up new territory or developing natural resources. The most prominent instance where a severe contest between two great roads has occurred in recent years, was that of the Northern Pacific-Union Pacific contest in 1901, which first arose over a question of disputed territory in the far West. This contest finally led to the formation of the Northern Securities Company and, while this company was adjudged illegal and obliged to dissolve, the ultimate outcome was the mutual understanding and harmonious relationship which have since existed between the Hill and Union Pacific interests. Another example of the importance of friendly relationships between the different interests is brought out by the incident which occurred in 1908 in connection with the Harriman and Gould groups, and which resulted in establishing at least a friendly understanding between the Gould party and the Union Pacific interests, over the question of the new Western Pacific line under construction by the Goulds from Ogden, Utah, to the Pacific coast.

The importance of the friendship question is especially vital when a smaller railroad is involved. There have been frequent instances where a small line of road, with good prospects and doing a good business, has met dis-

aster almost entirely because of a lack of mutual understanding or because of unfriendly relations with larger and more powerful lines. A few years ago a short line of road was constructed in a Western State and for some time operated successfully between two important points. Attempts were made by other interests of powerful resources to acquire control of this property, but these attempts resulted in failure. The outside interests then undertook the construction of a rival road at enormous cost, and because of their alliances with other properties and their general strength, they were able, within a comparatively short space of time, to entirely divert the traffic of the weaker road and cause it to go into the hands of a receiver. Had the weaker road been allied with, or had it arrived at a mutual understanding with the other interests, this disaster would never have occurred and the rival road, which was really unnecessary, need never have been built. The final outcome was that the weaker property was absorbed by the stronger, but only after the interests of the bondholders and stockholders had been heavily sacrificed.

VI

The Results of the Decade

An important question in relation to railroad results and earning power generally, is that of permanency, and it is a matter to which entirely too little attention is given by the average investor. What the railroad may have done in the matter of earnings last year, which was a poor year, may be a very poor indication of what it can do in better times or what it did do in a period of prosperity. And conversely, the "bumper" earnings of 1906 and 1907 may entirely mislead when the question of income in 1912 and 1913 comes to be considered. Many investors in both stocks and bonds were woefully misled by the 1906 and 1907 results of railroads, just as they were afterward misled by considering only the bad figures of 1908, or the lack of pronounced improvement in the earlier months of 1909.

The truth is that the principle of judging railroad securities on results for short periods is just as unsound and illogical as estimating the value of anything else of a business nature without considering the past record. A department store, if offered for sale, will bring more money (and it is worth more) if it can present a record of prosperity over a period of ten or twenty years, than

one which, while it may be currently doing as well as the other, has no strong record back of it. The same principle applies with equal force to the business of a railroad. With a 10-year record as a dividend payer, its stock will sell currently at a higher figure than were its dividend record only two years in duration; and this would be true were all else equal. An example of this is shown in connection with the Kansas City Southern and the Union Pacific. Each property has outstanding a preferred stock issue receiving 4 per cent. dividends per annum, and limited to that amount. The Union Pacific has paid its 4 per cent. dividend in every year since 1899, and on the average for the decade has earned the dividend five times over. The Kansas City Southern has paid its preferred dividend for five years and has earned a sufficient amount over each year to place the stock apparently on a safe and permanent dividend basis. But there is really no comparison between the two stocks as to security and position, when the results of the decade are considered. An examination of the Kansas City Southern record would divulge the fact that to show the same margin of surplus beyond dividend payments for the past ten years as did the Union Pacific beyond its 4 per cent. preferred dividend, it could have paid not more than $1\frac{1}{4}$ per cent. per annum on its preferred stock issue, thus indicating that, judged on the average results of the decade, the Kansas City Southern preferred has nothing like the secure position which the Union Pacific preferred enjoys.

The same idea is applicable to railroad results gen-

erally; and it is on this basis of averages of 10-year results that the entire scheme of analysis is worked out in my "Analyses of Railroad Investments." In every figure presented, the *yearly* average of every factor is presented for each year of the decade, and then these yearly averages are themselves averaged, thus showing *the average yearly results of the entire decade*. By this method, a basis is reached which strongly emphasizes the element of permanency and stability, taking into consideration, as it does, good times and bad, poor managements and good, changes in costs of material, of wages and of operation, rises or falls in freight and passenger rates; as well as the periodical changes in character of traffic and of tonnage.

It is believed that 10-year averages thus employed, present as sound and conservative a basis for relative comparison of results as can be found, and in addition to being used as the standard for classifying the security issues and giving them a rating, the 10-year averages are employed in the book for purposes of comparison with other properties of like general character. In every statement or analysis presented in connection with every 10-year table, the 10-year-average results of four other properties are shown, thus enabling the user to make quick comparison of every item.

The soundness and safety of this average principle can be easily demonstrated; especially when considered in connection with separate yearly results. On a property like the Atchison or the Lackawanna, where the entire record is that of great prosperity and steady growth in

nearly all items from year to year, the 10-year averages are, of course, not as strong as the figures of the past two or three years. But by using these averages instead of the figures shown for the past year or two, we discount, so to speak, the ultra-optimism of the moment and make full allowance for the possible effects of slower growth or prolonged set-backs which in the decade to come may appear either as a result of continued depression, inimical legislation, or from other causes. On the other hand, where the average principle is applied to a property like the Rock Island or the Chicago & Alton, the results as indicated for the decade average somewhat above the figures of the past year or two, and when considered by themselves it might be thought that they would be rather dangerous guides to follow in judging the security values or the general position of the road. But the average principle will work with equal force when a downward trend is involved, and will prevent a too pessimistic judgment of the property. If the road has been operating a decade and has shown some years of good results, followed by poorer years, it does not necessarily mean that the poorest years should be taken as the basis for permanent values, any more than that the best years should be used as the basis on railroads which have shown an upward trend.

Of course the application of this 10-year-average principle is to be taken in given cases with proper qualification, especially when extraordinary or unusual conditions enter in to affect the general result. Changes in the accounting methods within the past few years have,

to some extent also, varied the amounts and percentages for single years, but these changes, while in some cases producing a slightly inaccurate comparison between the last few years, have had little effect on 10-year-average results.

VII

Relative Values in the Railroad — The "Railroad-Mile"

All things are relative and must be measured by a fixed standard. This is just as true in considering railroad results as in considering other things. We cannot measure or compare the relative worth of a day's work and a pair of shoes except by measuring both according to a fixed standard of value, and this standard we call money; and we cannot measure the relative worth of a given piece of railroad property or a given amount of railroad results, except by means of a fixed standard for comparison, and this standard we call the "railroad-mile." To ascertain intelligently the condition and earning capacity of a railroad system we must consider everything in relation to the length of line operated, and measure all results by this standard. We must do this both in comparing the results over one year with the prior year or years, and also in comparing the results shown by one property with the results shown by another. If we do not do this any examination of railroad figures or railroad results which we might attempt to make would mean little or nothing, and would lead in many cases to perfectly grotesque conclusions.

To illustrate: A given railroad may have doubled its equipment, as represented by the number of engines and cars owned, within a space of five years, and this fact, considered without relation to changes in the mileage figures, would lead one to assume that the volume of business, as well as the tangible value of the physical property, had shown gratifying growth within the period. But if in the same years the operated main track mileage has grown in equal or greater proportion, then the fact is quite apparent that the volume of business may not have grown at all, and the actual ownership of movable property, as represented by engines and cars, may not be any greater, *per mile of road operated*, than was the case before. The same principle applies to all figures presented in the railroad report. Its gross business may double in amount of money in five or ten years, but if the mileage has trebled in that time, then the traffic of the road is not nearly so dense as it was at the beginning of the period. Its earning capacity is declining. But if we measure the gross earnings each year by figuring the amount earned per mile, we then get an accurate scientific basis for comparison, and can measure the figures with those of other properties which we also reduce to a uniform mileage basis.

The same idea applies with equal force to all the income records, including operating and maintenance expenses, income from investments and other sources, fixed charges, dividends and surplus. And when we come to the examination of questions of capitalization, the only measure we can use in a relative and comparative way

is that of the length of line operated. The application of this principle to all parts of the railroad report is the only sound method which can be employed for analyzing the roads and their securities.

But while all exhibits made in the railroad report can be intelligently analyzed by methods of comparison with like properties, the fact should never be lost sight of that many qualifying factors are constantly entering in which must be given due weight. Take the maintenance accounts, for example. Two properties, operating in generally similar territory, and transporting similar types of traffic, should, other things being equal, spend about the same proportion of their gross receipts in the up-keep of road and equipment. But it may be that in one case a large portion of the mileage is new, while in the other, the road has been operating its entire trackage for many years, and both its rails and equipment have had to stand the test of wear and tear to their limit. It is obvious, in such a case, that the older property, for this reason, should have more money per mile spent on it for its general maintenance than should the newer road. It is often noted that entirely new roads operate their lines at a very low ratio, and they are sometimes open to severe criticism for so doing. But as a matter of fact, they really may be spending even more for essential "up-keep" than the older and more or less worn-out properties which are perhaps disbursing larger amounts in the same accounts. In time, the newer property may have to increase its maintenance charges to the average attained by the older road; but it is no real evidence that

sufficient amounts are not being spent if the maintenance accounts are running light for the first year or two of operation.

A notable instance of special factors working for a light average transportation expense, as compared with that required on similar systems, is shown in the case of the Union Pacific main lines. For years the Union Pacific operated its lines at an abnormally low ratio as compared with roads like the Atchison, Missouri Pacific, Rock Island, and St. Paul. Many are disposed to take the position that the Union Pacific property is not being properly maintained, and that the heavy net earnings shown in recent years have been secured largely as a result of allowing the physical property to depreciate. But a moment's consideration of the matter will show that there are special reasons of sound and conclusive nature for the relatively low maintenance and operating costs on the Union Pacific main lines.

In the first place, the geographical position of the Union Pacific is unusual. Its main stem, which is the great traffic carrier, operates from Kansas City and Omaha to Ogden, Utah. At the former points it connects with a large number of systems radiating to every part of the North, South, and East. Traffic concentrates at Omaha and Kansas City from innumerable lines entering or connecting with those points. The Union Pacific gathers up this traffic which is laid at its feet, and instead of the vast amount of transferring, switching, etc., which many other roads are obliged to employ, in gathering traffic from a dozen or more feeders, the

Union Pacific enjoys the great economy of receiving the bulk of its through business at these great central points, and is thus able to permanently make great savings in general operating costs, which many other roads could not do. And further than this, at its Western terminus the conditions are very much the same. It receives the bulk of its through business from the coast at Ogden, all the tonnage of the Central Pacific and the Oregon lines concentrating at that point. It is therefore quite apparent that not only has the property special advantages for keeping down its general operating costs, as compared with others, but because of this ability to concentrate the handling of its tonnage the wear and tear of its equipment is apt to be far less severe.

These examples are cited simply to emphasize the importance of looking below mere surface figures when examining in a comparative way the operating or other exhibits of the railroad. There are often qualifying factors of equal importance in the financial statements, and here also it is always necessary, in making a careful analysis of a given situation, to seek below the surface for any special causes which may help to justify or explain unusual differences in the relative showing made by a given road as compared with other roads of like type, when the surface facts do not definitely explain them.

As already pointed out, the three chief elements in the business of railroading are the Physical Factors, the Income Factors, and the Capitalization Factors. These three classes of characteristics are distinct and yet they

are all related and interdependent, and all come in for equal consideration in any analysis of a railroad report or railroad results. We will now take up and examine these three groups of factors in their proper order.

The Physical Factors

VIII

The Physical Factors

Grouped under the head of the Physical Factors in the business of railroad operation are the records of Mileage and Equipment as well as other figures bearing on the physical side of the property. Nearly all railroad reports furnish the full figures necessary for making a comparison of the physical factors. Records of this nature in the average reports made to stockholders are not, however, always arranged in such form that the ordinary investor, not familiar with accounting principles, can make much use of them. Tabulations presenting freight or passenger traffic statistics, and embracing such items as "train miles," "locomotive miles," "train mileage per mile of road" and "average number of passengers per train or engine mile," have little or no meaning to the average shareholder, and, as far as he is concerned, he apparently feels that they might as well have been left out of the report. But if he had some method for placing such figures in proper relationship to the other things in the report which he can understand, he would grasp their importance and meaning at once. And if, in addition to this, he could compare these and other figures shown with results and records of

previous years, he would quickly find that the railroad report, instead of being made up of a large amount of technical matter which is of interest to railroad managers only, really embraces nearly all items required for making quick and intelligent comparative deductions.

But even when investors and dealers in railroad securities do possess the knowledge required for placing all the figures in the reports in their proper relationships, and are fully capable of making sound deductions, it is not possible for many to secure the necessary records more than a year or two back. Railroad reports themselves usually get out of print after a year or so; the current periodicals seldom publish the full records, while the manuals give some of the facts but not all. The records of the Interstate Commerce Commission embrace nearly all the facts that are necessary, but they are not presented in very satisfactory form for intelligent and accurate usage. Therefore, one of the chief purposes of "Moody's Analyses" is to furnish the complete back records of all the railroads for the full period of a decade; and this has been done in practically every case in the reviews of the railroad systems. As already stated, the deductions finally made for showing the position and value of the different security issues are all based on the average results of the decade closing with the latest fiscal year.

IX

Average Miles Operated

This is the "yard-stick" by which everything is measured, and indicates the length of line operated by the company during the given year. "Average miles operated" does not include second, third or fourth track, nor any mileage controlled but not directly operated. The true figures given on which results apply are the operations or earnings of directly operated lines alone; that is, the results of lines which figure in the income accounts of the company. They often include the results of a leased or controlled line, but only where the leased or controlled line is directly operated; and in this case the mileage of the leased or controlled line is always included in the report in the "average mileage operated" of the main system. Where such mileage is separately operated, a separate analysis is of course necessary. For example, in the case of the Reading Company system, an entirely distinct report is furnished by the Central Railroad of New Jersey, which is the leading separately operated controlled line.

It might be assumed that a better comparison could be made on the basis of *length of track* rather than *length of line*. That is to say, while all railroads have

some extra tracks, such as second, third and fourth tracks, yet it may seem that a comparison of two roads, one of which is 90 per cent single track and the other only 50 per cent single track, would be misleading. And it would, if the fact of the extra track or proportion of extra track were not taken into consideration. But it will be realized that to work out all the comparative figures on the basis of length of track would lead to very inequitable comparisons and grotesque results. Extra main track on a railroad does not in any case reflect the same earning capacity as the first track. A second track on an ordinary railroad line in the Eastern states might perhaps add from 30 to 50 per cent to the possible capacity, but it would in no case double the capacity. Therefore, length of line in second track is not of the same relative significance as length of line in first track. The New York Central has a large percentage of extra main track, a substantial proportion of its main line being equipped with from three to four tracks. On the other hand, the Erie Railroad has a lesser percentage of extra main track and a portion of its main line through to Chicago is single track. Yet the density of freight business on the main lines of the Erie, as shown by the records, is practically equal to that of the New York Central. While extra main track is a factor of importance it cannot be used as a mileage basis for a fair comparison.

At the same time the existence of all extra main track and its length must be considered in any comparative examination of railroad results, and in most

railroad reports a statement of extra main track, wherever it exists, is furnished with the record of miles operated of main track each year. These two sets of figures thus show the investor the proportion of the average mileage which is equipped with more than one track, and, of course, back records reveal the trend of improvement in that direction. Where extra main track is increasing in greater ratio than the main track mileage, it is an indication that the capacity of the road for handling its business has been increased and that its volume of business in general terms should be growing. As an illustration of this, an examination of the Illinois Central reports in recent years is worth making. During the decade the average mileage operated (length of line) of the Illinois Central system has increased from 4,276 miles to 4,563 miles, an increase of about 6 per cent. During the same period its extra main track has grown from 535 miles as reported in 1902 to 792 miles in 1911, an increase of nearly 50 per cent. All of this increase has not, of course, been second track, some being third or perhaps fourth track. But every extra track which is main track mileage—that is to say, not switches, yard tracks, or sidings—is always classed as extra main track.

As will be seen by a general examination of railroad reports, very few railroads in the United States can boast of extra main track up to 50 per cent of their length of lines. Systems like the New York Central, the Pennsylvania, and New Haven report more than 50 per cent in extra main track, but it must be remembered

that a proportion of this is represented by third and fourth tracks and that, therefore, a very substantial part of the system is equipped with one track only. In the Western States most of the railroads are almost entirely single track, even a property like the Burlington reporting extra main track equal to only 8 per cent of its operated mileage and the Atchison reporting only about 6 per cent. The Missouri Pacific reports for 1911 only 171 miles of extra main track on its entire system of 7,235 miles, while the Kansas City Southern, with 827 miles operated in 1911, reported but 14 miles of extra main track. The Iowa Central reported no extra main track whatever, nor did the Missouri, Kansas & Texas system.

In nearly all railroad reports the miles of yard tracks and sidings for the latest fiscal year are also stated, thus enabling the investor to get a complete general idea, not only of the length of the line and the trend of growth in length of line for the decade, but also the density of growth which is reflected by increase in extra main track, and in addition to get some conception of the amount of mileage embraced in terminals, switches, etc. Having these general facts before him and comparing the figures as shown in the reports with the average mileage and extra main track figures of other properties similarly located, he will be in a position to make an intelligent comparison. For example, the relative difference will be seen at a glance between the mileage of the St. Paul and the mileage of the Chicago & North Western. For the year 1911 the average mileage directly operated on the St. Paul was 7,512 miles, and the extra

main track average 627 miles, while on the Chicago & North Western 7,719 miles of average main trackage were operated with 1,027 miles of extra main track, showing at once that the North Western is equipped with a much higher percentage of extra main tracks than is the St. Paul. The same test applied to the Burlington would show that whereas the Burlington main track mileage averaged 9,072 miles for 1911, the extra main track averaged but 684 miles, a lower percentage in relation to the total length of line than that reported by the St. Paul.

Other facts of value in connection with the trackage of the railroads, into which, however, it is not deemed necessary to study in such full detail, relate to such matters as the character of grades and bridge construction, weight of rails, etc. Many of the large systems during the past ten or fifteen years have been replacing their lighter rails with steel rails of much heavier weight and, therefore, greater capacity. But these items are not of the same importance as was the case twenty-five to thirty years ago when the railroads were changing from old, light-weight iron rails averaging 40 lbs. to the yard, to steel rails averaging 60 lbs. Most well-equipped railroads nowadays use rails averaging from 65 to 100 lbs., and the Eastern systems and trunk lines especially are all equipped with this character of rail. On the New York Central and Pennsylvania main lines the rails average from 90 to 120 lbs., this heavy weight being necessary for the heavy cars and engines, increased freight density, and larger trainloads. For branch lines and

feeders and light carriers a rail averaging from 55 to 70 lbs. is practically as serviceable. Nearly all annual reports of railroads furnish figures showing the average weight of rails on their lines, and in some cases they show the life of the rails, generally indicating their condition, etc.

So much for the trackage figures, which, as represented by mileage operated, as already stated, should be the basis for working out all the comparisons and making all the deductions in this particular field.

X

Equipment

The equipment of a railroad consists of its movable property, that is to say, its engines and cars. Equipment as understood in railroad reports does not include such property as buildings, stations or other structures. It does include floating equipment, such as boats, tugs, etc., where a road has use for such, but as instances are rare where floating equipment is relatively important, the equipment question resolves itself almost wholly into the field of locomotives and passenger and freight cars. Just as it is important to know something about a railroad's location, its character of traffic and its length of lines, so it is important to have at hand full facts regarding its actual, movable property. In fact, the equipment is the machinery with which it does its business; it is constantly in motion, subject to endless wear and tear, and requires constant replacement. Every railroad report which is properly constructed furnishes a full statement of equipment, showing not only the number of engines owned, but usually the weight and tractive power of these engines and often their age, and also the number of engines destroyed or displaced from service within the year and the number of new engines acquired. The total

number of engines shown in use for the year is the net number after adding the new engines and deducting those destroyed or worn out. The same plan is followed in statements of passenger and freight equipment as well as company cars. The term "company cars" signifies those cars used for company work and includes dirt cars, derricks, cabooses, etc. Company cars are separately classified, as they are not supposed to be direct revenue producers. On representative systems the company cars usually equal about 3 per cent of the total number of freight cars owned by the Company.

It is sometimes the custom in making up analyses of railroad reports to reduce the number of engines and cars to a mileage basis just as the earnings are so reduced. That is to say, in addition to noting that the St. Paul owned, in 1911, 1,244 engines, we would divide that number of engines by the mileage operated and thus ascertain the number of engines *per mile* or the proportion of an engine per mile. But this method of statement is extremely technical, it involves the introduction of close fractions, and for ordinary analytical purposes is not necessary. Therefore, the method is usually followed of ascertaining for each year the actual number of engines and cars owned or controlled. As the mileage figures are quickly ascertained and compared, the relative significance of the equipment and the mileage can in all cases be readily seen. It should be explained also that the statements of equipment given in reports in nearly all cases classify separately equipment owned in fee and that embraced in equipment trusts. Many

railroads follow the plan of "trusteeing" the equipment they buy from year to year, and paying off the obligations out of earnings as the equipment is being used. In this way, by the time the equipment is worn out or by the time substantial amounts have been spent on it for its maintenance, it is entirely paid for out of earnings, and is then owned in fee without having involved the creation of any permanent capital obligations for its purchase. It is sometimes assumed that only those railroads which have poor credit follow the equipment or car trust idea. But this is not true, as many roads of very high credit, such as the Pennsylvania, purchase all their equipment in this way, and pay for it serially out of the operating results of the equipment itself. The payments from year to year on "trusteed" equipment are usually included in the fixed charges, or at least are deducted from the profit and loss accounts, and in the statements of capitalization the equipment issues are included as liabilities with the bond issues..

A comparative record of engines and cars extending over a series of years is of special value in indicating the growth of the business of the company and also its increase or decrease in the possession of movable property. Practically all American railroads have shown decided increases in these items during the past ten years, and it is only here and there that a road has reported an actual decline in quantity of equipment owned. The back figures are of value for comparative purposes for the different years and also for comparing one railroad system with another. For example, in comparing the

St. Paul with the Burlington, we find that, as related to mileage, the equipment figures are very much the same, and the trend over a ten year period has been decidedly similar. But if we compare the directly operated lines of the New York Central with those of the Pennsylvania Railroad we find that on mileage averaging much the same during the decade the locomotive equipment of the New York Central averaged much less than that of the Pennsylvania. This, of course, indicates at once that the Pennsylvania Railroad has uses for a far greater number of locomotives for the carrying on of its business than has the New York Central. In passenger cars we find that the average figures of the two systems for the decade are almost the same, while in freight equipment the New York Central reports an average of 67,114 cars while the Pennsylvania reported an average for the decade of cars owned amounting to 62,359. In the case of the Pennsylvania, however there are a large number of freight cars held under equipment trusts, making the total freight equipment available for service at the close of 1910, 139,680 cars, thus showing that at the end of 1910 the total number of freight cars used on the Pennsylvania Railroad's directly operated lines was about double the number used by the New York Central. An enormously greater volume of business is reflected in the Pennsylvania equipment figures as compared with those of the New York Central.

In examining comparative statements of equipment figures, several qualifying factors should be kept in mind. For example, while an increase in the number of engines

owned from year to year implies the growth of locomotive equipment, it is not an entirely accurate guide for the reason that the capacity of locomotives has changed to a marked extent during the past ten years. For instance, the average weight of the locomotives used on the Union Pacific system in 1901 was about 55 tons, while those being used to-day measure up in most cases to as much as 83 tons, thus showing an increase in capacity for locomotives equal to perhaps 50 per cent over the conditions of ten years ago. The same facts apply to more or less extent in freight equipment. The introduction of the pressed steel car and the modern freight car of large capacity has resulted in displacing thousands of light-weight, small-capacity cars such as were used a decade or more ago. Thus in many cases where an increase is shown of 25 per cent in the *quantity* of freight cars during the decade, it may easily be that the average *capacity* of the freight equipment has increased far more than 25 per cent. For example, if we examine the coal-carrying roads, such as the New Jersey Central, the freight equipment figures should especially be considered with this fact in view. A large part of the New Jersey Central freight equipment consists of coal cars, and prior to 1904 many thousands of these cars were the old-fashioned four-wheel boxes with a capacity of about ten tons of coal each. But these were rapidly replaced after 1903 with pressed steel cars of a capacity several times greater, and, of course, the *quantity* of individual cars owned naturally declined. But the general business of the New Jer-

sey Central grew so rapidly during this period, that the actual decline in number of cars owned was very small, and in 1911 the company reported a larger number of freight and company cars than it reported in 1904, just before the rapid replacement began.

The same facts should be borne in mind in relation to passenger equipment. The replacement which is constantly going on results each time, in progressive railroad systems, in cars of better construction and larger capacity taking the place of those displaced, so that the mere quantity in itself is not a complete guide in the matter. As in the case of locomotive equipment, most good railroad reports give details regarding the tonnage capacity of freight equipment and the general character of passenger equipment.

XI

Proportion of Freight to all Traffic

It is important to know, in examining a railroad report, what proportion of the business done is represented by the freight and what proportion by passengers or receipts from other kinds of transportation. As a whole, American railroads report an average of about 30 per cent in passenger traffic, the remaining 70 per cent being made up of freight, expressage, mail matter, etc. Eastern roads, as a rule, report a larger proportion of passenger traffic than those in the West and South, and as a matter of fact, there is a fairly wide variation between the percentages on the various railroad systems even when located in the same territory. For example, while the percentage of freight to all traffic on the Pennsylvania Railroad has averaged for the past decade 73 per cent, on the New York Central it averaged only 59 per cent. On the Norfolk & Western it averaged 84 per cent, while on the Baltimore & Ohio it averaged 76 per cent. The Delaware & Hudson reported an average of 80 per cent, but the Delaware, Lackawanna & Western average was but 73 per cent. Going further west we find that while the percentage on the Chicago & North Western was 70 per cent, on the Illinois Central

it was but 67 per cent. The Hocking Valley business was 80 per cent freight traffic, while that of the Pittsburgh & Lake Erie was 90 per cent. In the East, the New Haven, which depends chiefly on passenger business, reported an average of only 50 per cent for freight, while the Long Island Railroad, the traffic of which is confined to a very limited area, reported a freight percentage averaging but 28 per cent of the whole.

1. The value of this record showing the proportion of freight to all traffic is two-fold. First, it indicates the character of traffic which is of most importance to the railroad and which is the source of most of its income, thus enabling the person examining the record to know the significance of changes in the freight or passenger rates and also when examining the operating records to
2. properly judge the maintenance and operating costs. In addition to this, a 10-year comparative record shows at a glance any changing trend which may be going on in the character of the traffic. It is important to know, for example, that the Pennsylvania Railroad reported 73 per cent of its business as freight in 1901, while in 1910 the proportion was up to 75 per cent. On the Kansas City Southern we find that in 1902 the proportion of freight was 82 per cent and that during the decade there was a moderate downward trend resulting in an average in 1911 of 73 per cent. This average shows that the Kansas City Southern Railway now relies more on its passenger business than it did ten years ago.

XII

Passenger and Freight Density

Every complete railroad report contains statements showing the number of passengers carried during the year, the number of passengers carried one mile, the average number of passengers carried, and various other records of the same nature. Under "freight traffic statistics" figures are also generally furnished of the number of tons carried during the year, with the number of tons carried one mile. As a general thing, entirely too little attention is given to these figures by the average shareholder when examining his report. The relationship of these figures to the general earning capacity of the property is not appreciated or understood and, therefore, these operating records are passed by without examination or analysis.

It would be well if traffic statistics of this kind were presented in more intelligible form and if comparative records were shown extending over a series of years. The chief value of these figures to the investor is that by means of them he can ascertain the relative volume of business being done by the railroad in both passengers and freight and, if he has the complete records at hand, can make comparisons both with the records shown in

previous years and also with the records made by properties of similar type and operating in similar territory. But the average investor does not have at hand a series of reports covering a term of years, and therefore cannot readily make an intelligent use of the figures. As a matter of fact, these traffic figures are not amenable to comparison unless reduced to the mileage basis just as all other operating records must be. For example, an investor examining the Baltimore & Ohio annual report for the year ending June 30, 1911, will find it stated under the head of "passenger traffic statistics" that the number of passengers carried during the year was 21,969,166, and that this was an increase of 862,046 as compared with the previous year, a growth in number of about 4 per cent. Following this he will find that the number of passengers carried one mile is given as 795,884,886. He will then find it stated that the number of passengers carried one mile *per mile of road* was 179,506. Passing to the freight traffic statistics, he will find a record of the same kind in relation to the tons carried, the number of tons carried being 60,547,887, the number of tons carried one mile, 11,703,539,445, and the number of tons carried one mile *per mile of road*, he will find stated as 2,639,634, which is shown to be a decrease of about 3 per cent. as compared with the figures of the previous year.

As no other records are given in relation to these figures to indicate to the investor just what their in-

telligent use may be, it is quite natural that their significance is not appreciated.*

Generally speaking, if a railroad is increasing its gross revenue per mile, its passenger and freight density will show an upward trend. This will not always follow, however, as it may be that for special reasons the property will be comparatively a light carrier of passengers or freight, and without increasing the *volume* of its business per mile, it may increase its gross receipts. But, as a rule, the trend in the density should be upward, and it generally will be upward, as the operating efficiency of the property improves. An illustration of the results shown (on the average) by the Pennsylvania and the New York Central in freight density for the past decade, will be worth considering. With average operated mileage only about 6 per cent less, and with gross earnings per mile averaging for the New York Central about 34 per cent less than they have averaged for the Pennsylvania, we at the same time find that the freight density on the Pennsylvania has averaged nearly 90 per cent heavier during the decade than it has on the New York Central. To present the exact figures, the Pennsylvania reported an average density of 4,395,162, and

* It is one of the main purposes of "Moody's Analyses" to enable the investor to employ these figures simply and intelligently in the use for which they are intended. In the table of Physical Factors in each analysis the figures showing passenger density and freight density are presented for each year of the decade, with the 10-year averages and comparisons complete. "Passenger density" is simply an abbreviated term for the figure showing the number of passengers carried *one mile per mile of road*. Its value is relative purely and it shows concisely the volume of passenger business done, and the increase or decrease from year to year, thus indicating the upward or downward trend as the case may be. When compared with other properties it indicates which roads are doing a heavier relative passenger business. Exactly the same principles apply to the figures showing "freight density."

the New York Central, 2,322,263. The significance in this comparative showing is, that the Pennsylvania operates more and heavier trains, carries more tonnage on these trains, moves a less proportion of empty or half-filled cars, and altogether gets a good deal more work out of its operations than does the New York Central. The passenger business on the New York Central, however, makes a showing superior to that of the Pennsylvania, the density on the former being considerably heavier. But the New York Central relies to less extent on freight business than does the Pennsylvania.

As already pointed out in the earlier pages, the significant and vital question back of the earning power of a railroad, and therefore back of its securities, is the intensive development of the operating side of the property. The density figures bring the condition of this development out very strongly, and when examined in connection with the showing made in gross revenue, in maintenance expenditures and in net receipts, they take on much importance. When we take up the discussion of the Income Factors of railroads, we will note the close relationship between income items and the density figures. Briefly, the more work that can be gotten out of a given mile of railroad operation, as figured on the average, the more satisfactory is apt to be the income account of the property.

During the past decade the great majority of American railroads have reported steady increases in traffic density, thus reflecting concisely the steadily growing traffic of American railroads. But there has been

a wide divergence in this general trend, some properties showing density increases far more rapidly than others, while as considered in relation to the trend of gross receipts per mile, we will find still other differences of great significance. Some roads, like the Lackawanna, which have reported no important mileage increases during the decade, have shown an actual doubling of both passenger and freight density, while others with mileage increases running as high as 100 per cent. have also reported equally great proportionate increases in the traffic density. It will be realized that if a railroad is increasing its mileage every year and at the same time increasing its traffic density in greater ratio (which is simply the number of tons carried one mile per mile of road), it is making greater progress relatively than when it is not increasing its mileage each year. The Atchison system has made a very strong record during the decade, both in the matter of mileage growth and in traffic density increase. With a mileage growth of 32 per cent. since 1902, it reports a freight density increase of almost 25 per cent and a passenger density increase of over 60 per cent. The Atlantic Coast Line Railroad, with a mileage at the end of the decade over 160 per cent greater than at the beginning, reported a freight density growth of 60 per cent. and a passenger density growth of 70 per cent. On the other hand, we find that the Baltimore & Ohio, while reporting a mileage increase of great extent, shows only a moderate growth in density. While these figures on the Baltimore & Ohio do not imply that the road has not been efficiently

operated, they do mean that the chief hope of the Baltimore & Ohio during the past decade, in the direction of increased profits, has been bound up more directly with the question of stable freight rates. The average totals of freight density on the Baltimore & Ohio were heavy at the beginning of the decade, and in comparison with other properties doing a larger gross business in dollars, they have always been surprisingly good. Comparison with a property like the New York Central brings this fact at once to the front. If we examine the freight density figures of the Hocking Valley, however, we will note that there has been an increase in the decade of nearly 40 per cent and that the average figures of recent years have been at least 40 per cent higher than those of the Baltimore & Ohio, although the figures ten years ago were only about 10 per cent higher than the figures shown at that time by the Baltimore & Ohio. The meaning of this comparative record simply is that the tonnage of the Baltimore & Ohio, at the beginning of the decade, had already been developed to practically its full capacity, while that of the Hocking Valley had not. To-day the Hocking Valley has apparently reached nearly its highest development in tonnage and, other things being equal, will probably not show during the coming decade any pronounced upward trend in this respect.

XIII

Average Freight Train-load

Most railroad reports present figures showing the train-load for the year, but many do not. However, they all furnish other figures by which the investor can very easily ascertain the train-load. The "train-load" indicates the *number of tons of revenue freight carried on the average on each train operated per mile*, and its great value is in its indication of the efficiency or non-efficiency of the operating methods of the property. If the train-load of a railroad is increasing it usually means that its volume of business is growing, that it is carrying less half-filled cars, and therefore generally doing its work more profitably. The train-load is ascertained by dividing the number of tons of freight carried one mile, by the freight-train mileage. Each report presents the figures of the latter, which are the aggregate number of miles run during the year by all freight trains which have been operated for revenue.

There is great variation in the train-load of railroads in the different parts of the country, and the size of the train-load has direct relation to the character of tonnage carried. The coal-carrying roads, which operate at low cost and receive very low freight rates and must, there-

fore, run extremely heavy and long trains, generally show a far heavier train-load than those which carry higher grade tonnage. To illustrate, the New Haven road, which does chiefly a "high-grade" freight business, reports an average train-load for 1911 of but 290 tons, while the Pennsylvania, with its tonnage made up to the extent of nearly 66 per cent of mining products, shows a train-load of 649 tons. The Norfolk & Western, operating in the soft-coal fields, shows an average train-load of 647 tons, while the Chesapeake & Ohio reports 683 tons. The railroad reporting the heaviest train-load of any in the country is the Pittsburgh & Lake Erie, where in 1910, the average was 1,256 tons and for the decade an average of 1,040 tons. The western grain-carrying roads, such as the St. Paul, show a much lighter average in this respect, and range usually between 225 tons and 300 tons. The Rock Island reported for the decade an average of 237 tons and the Burlington 359. Turning to the Southern States we find that traffic is still lighter and that a road like the Central of Georgia reported 222 tons for the decade, the Atlantic Coast Line 182 tons, and the Seaboard 194 tons.

There is a direct relationship between the traffic density and the train-load and as a usual thing, with an increasing freight density, there will be a growing train-load. This does not always follow, however, as is illustrated by again recurring to the figures of the Baltimore & Ohio, where, with only a moderate growth in freight density, the train-load increased from 382 tons in 1901 to 441 tons in 1911. Variations in the train-load

result from a number of causes. If, as is the case with the Erie, and to some extent with the Pennsylvania, heavy grades are a feature of the line and, therefore, in many instances two or three engines are attached for long distances to trains, the relative average train-load will naturally be heavier than where these conditions are not present. The Great Northern has always been noted for its heavy train-load, but here is a case where the *absence* of grades is a factor. As a general thing, the Great Northern operates heavier and longer trains than any of its rivals, and it is able to do this for the reason that where they must climb mountain ranges, it avoids the steepest grades. Its average in this item for the decade was 497 tons as compared with 286 tons on the Canadian Pacific and 395 tons on the Northern Pacific.

So it will be seen that, dependent on the policy of the company, and also on the topography of the territory, a train-load may be either heavy or light. With the low-grade, coal-carrying roads it is heavy because they operate large capacity trains with single engines; with the steep-grade coal carriers, it may be heavy when they operate long trains with two or more engines attached, as in the case of the Erie, and the Pennsylvania system on such lines as the Northern Central. A more accurate comparison of results for these two types of road would be secured by reducing the tonnage to engine-miles and not to train-miles. This can usually be done by means of the engine-mileage figures which are furnished in most of the reports.

As a general proposition, however, if a train-load is

showing a relative upward trend, it signifies that the efficiency of the company (its intensive development) is improving; while if the train-load remains stationary or steadily tends downward (unless for special reasons) it should be a danger signal to the security holders.

An example of an unusual showing in the train-load is that of the Minneapolis & St. Louis. Here we find that the train-load at the end of the decade was practically no higher than at the beginning. But we also see that the freight density during the 10-year period actually declined about 50 per cent, while passenger density remained about the same. Mileage operated grew during the decade about 100 per cent, and as new mileage was added year by year, the average earnings per mile grew smaller. The company easily paid regular dividends on both its preferred and common stocks in the earlier years, but in 1909 failed to earn its preferred dividend (although it was paid) and dividends have since been discontinued altogether. This would be a far more unsatisfactory showing than it is were it not for the fact that the mileage has been added to each year without increasing the capital items in as great a ratio; and, as measured on the mileage basis, the fixed charges have declined considerably, although in less ratio than the net earnings have recently fallen off.*

* As arranged in "Moody's Analyses," the train-load records are of much value. Their worth to the holder of securities is, as already pointed out, in their comparative use and in relation to the trend, and in connection with the showing made by other properties in similar territory. While these figures can be dug out of annual reports (if one has the reports) they are nowhere else available, and are here presented in complete and convenient form.

XIV

Train-mile Earnings

Any well constructed table showing comparative figures over a series of years of the train-mile earnings of the different properties is of very great value in analyzing the securities of the railroad. The figures are obtained by dividing the total gross receipts of the year (given in totals in all reports) by the "revenue train-mileage." The latter figures are always given among the traffic statistics, and are simply the number of miles run during the year by all passenger and freight revenue-producing trains. "Non-revenue mileage" (miles run by work trains, etc.), is not usually included in these figures. Any mile run by any revenue train is a "revenue train-mile," and it will be realized that these train-miles in a year run up into the millions. For instance, the Baltimore & Ohio report for 1911 shows that in the freight traffic for the year, there were no less than 26,557,919 miles run; which means that freight trains on the Baltimore & Ohio railroad ran a length last year equal to over one-quarter of the distance between the earth and the sun, and about ninety times the distance between the earth and the moon. Passenger trains ran during the same year 16,369,066 miles, so that if we add the freight and

passenger train-miles together, we get a total of 42,926,985 miles as the aggregate distance run by revenue trains of all kinds on the Baltimore & Ohio last year. To give another example, we find by the Pennsylvania Railroad report for the year 1910, that the mileage run by revenue freight trains that year was 31,247,374 and by revenue passenger trains 26,350,862, a total for both of 57,598,236 miles; a distance equal to nearly two-thirds of the vast space between the earth and the sun. No more vivid idea of the essential character of railroad property—property in motion—can probably be gotten than by reflecting on such facts as these.

As the total gross operating revenues from transportation on the Baltimore & Ohio in 1911 were \$87,264,060, we find that by dividing this figure by the number of miles run by all revenue trains (42,926,985), we will get \$2.02 as the gross amount of money earned on the average on every mile run by trains during the year. This amount is the gross revenue per train-mile or train-mile earnings. Its value in an analysis will be recognized at once. It shows the gross earning power of the property, and is, more than any other, the key to the entire question of railroad values. Considered comparatively, over a series of years, it indicates the trend of change from year to year, showing whether the road is improving or declining in its capacity for doing business, and also, what its position is in this regard in relation to other properties of like general character.

Different railroads show great diversity in train-mile earnings as in almost everything else. Thus, while East-

ern roads like the Baltimore & Ohio have averaged during the decade in many cases less than \$2.00 per train-mile many of those in the West have shown averages far above this figure. The Baltimore & Ohio has averaged for the decade \$1.94; the New York Central, \$1.91; the Atlantic Coast Line, \$1.80; and the Southern, \$1.62; while the Atchison reports an average of \$2.30; the Union Pacific, \$2.97; the Northern Pacific, \$2.87; and the Great Northern, \$2.93. In change of results through the decade we find that the train-mile earnings on the Atchison rose from \$2.00 in 1902 to \$2.52 in 1911; those of Buffalo, Rochester & Pittsburg rose from \$1.91 to \$2.42; the Great Northern from \$2.60 to \$2.80; the Chesapeake & Ohio from \$1.76 to \$2.31; the Burlington from \$1.60 to \$2.32, and so following.

The train-mile earnings on a railroad do not necessarily expand in ratio to the increase in train-load or in traffic density. A case in point is that of the Alabama & Vicksburg. The train-load on this property has increased 30 per cent. since 1902; its freight and passenger density have nearly doubled and its gross revenue has increased per mile over 70 per cent. But the train-mile earnings have stood absolutely still, and in 1911 averaged even less than they did in 1902. But in the earlier year they were abnormally high for a road of this type, and although far more trains are being run to-day and far more money made, the earnings on every mile run are no more. The road is simply running more trains in a given time and making exactly the same money per train. One of the reasons for this is that the

freight rates are nearly 15 per cent. lower than they were at the beginning of the decade. On the other hand, if we examine the figures of the Chesapeake & Ohio, we will see that whereas in 1902 the earnings per train-mile were \$1.76, by 1911 the figure had increased to \$2.31, an expansion of 50 per cent., and indicating that, as shown by the mileage growth, the equipment increases the changes in traffic density and the train-load, while the business activity of the system had undergone growth and expansion during the decade, yet on every mile run \$2.31 was earned in 1911 as against \$1.76 in 1902, thus indicating great progress in operating efficiency and general earning power.

It can be set down as a general principle that where a railroad is showing a high average in train-mile earnings or a healthy upward trend, there is little fault to be found with the operating side of the property, regardless of what the financial side may be. The Erie, while its capitalization features are not entirely to be commended, makes an excellent showing in earning power for the decade. The earnings per train-mile increased from \$1.82 in 1902 to \$2.34 in 1911, and the average for those years was considerably higher than that shown by the New York Central. If, however, a road does not improve its train-mile earnings as its traffic grows or as its mileage expands, then, like the decreasing train-load, it is to be regarded as a matter for careful analysis by the security holder.

The *net earnings* per train-mile can be ascertained in the same manner as the gross, by dividing the net

operating revenue by the total train-mileage, thus showing the amount of *profit earned per train-mile*. On like principles, the gross freight revenue per train-mile and the gross passenger revenue per train-mile can also be ascertained.

While we can ascertain the net operating revenues per train mile by the method indicated above, it is an unfortunate fact that no separation of the net passenger and net freight earnings of the railroads can be obtained. Although the Interstate Commerce Commission requires the roads to report their operating expenditures in great detail, and in a uniform manner, there is no requirement that the expenses of passenger and freight business be separately stated. Thus, we can never know whether the passenger business of a given road is profitable or not, or how profitable it is. If, however, the roads were required to so construct their accounts as to enable the stock- or bondholder to see the relative profitableness of these two departments of the transportation business, a great step forward would have been accomplished in the direction of corporate publicity.

Of course there are some effective arguments against this suggested change, and many roads would protest aggressively against it. But when the matter is considered from all points of view it will probably be found that the roads themselves would be the gainers by this reform. For a long time it was contended that the present requirement of the Commission that the roads state their "outside operations" separately

from their traffic earnings, would work great injury ; especially because some of the roads have always been obliged to incur net losses in these "outside operations." A few years experience has shown, however, that the fears of railroad managements in this respect were entirely unfounded.

In fact, the more complete the publicity of railroad operations and accounts, the better it will prove to be for the managements and security holders alike.

XV

Passenger and Freight Rates

Railroad reports nearly always furnish their stockholders with figures showing the average rates received per passenger per mile and per ton per mile. Where they do not, these figures can always be ascertained by the following method: For the average rate received per passenger per mile, divide the total passenger earnings for the year by the number of passengers carried one mile. The result will give you the average figure (in cents or mills) received per mile per person. The same principles applied to the freight traffic (dividing the total freight earnings by the tons of revenue freight carried one mile) will give the average freight rate per ton per mile.

The freight and passenger rate statistics are of great value in the analysis of the railroad report, particularly when used in a comparative way. Compared over a series of years they show the actual tendency toward higher or lower levels, and as the rate directly affects the earnings of the property, a pronounced change in either direction may be of the utmost importance.

The average gross revenue per passenger per mile on all the railroads of the United States for the year

ending June 30, 1910, as reported to the Interstate Commerce Commission, was 1.938 cents (one cent and nine hundred and thirty-eight thousandths of a cent). The average revenue per ton per mile for the same year was .753 cent (seven mills and fifty-three hundredths of a mill). Both passenger and freight rates vary in different types of traffic and in different parts of the country, although, for most long-haul and interstate traffic, passenger business nowadays tends everywhere to seek a common level. On many of the lines, where local traffic largely predominates, passenger rates are high as compared with the general average. On the Bangor & Aroostook in Maine, the average rate during the past ten years has been 2.42 cents, while on the Erie the rate has averaged but 1.50 cents and on the Lackawanna but 1.42 cents. The far Western properties, such as the Great Northern, the Northern Pacific, and the Atchison report much higher passenger rate averages than most Eastern properties. During the decade the Great Northern rate per passenger mile has averaged 2.31 cents; that of the Northern Pacific 2.21 cents, and that of the Atchison 2.14 cents. In the Eastern groups we find the New York Central averaging but 1.76 cents for the decade, the Pennsylvania 1.99 cents, the Baltimore & Ohio 1.95 cents, and the Lehigh Valley 1.74 cents. Southern properties, as a whole, have generally shown higher averages than those located north of Washington. Thus, the Atlantic Coast Line reports an average of 2.37 cents for the decade; the Central of Georgia 2.28 cents; the Louisville & Nashville 2.34 cents; the Seaboard

Air Line 2.27 cents, and the Southern Railway 2.29 cents.

Variations in freight rates among different railroads are shown to be much more pronounced than in passenger rates. This fact is chiefly due to the vast difference in the types and classifications of tonnage transported on the different lines. For example, the Chesapeake & Ohio, the freight traffic of which is largely soft coal, reports the average gross rate on freight business for the decade of .43 cent (four and three-tenths mills) per ton-mile, and in the year 1900 operated on as low an average as .34 cent (three and four-tenths mills). The Norfolk & Western average was .47 cent, that of the Erie .60 cent, the Baltimore & Ohio .57 cent. On the New England properties, however, where the freight traffic is well diversified and largely of a local nature, we find the freight rates per ton per mile double or more than double those among the class of properties we have been mentioning. On the New York, New Haven & Hartford the average rate for the decade was 1.42 cents, on the Boston & Maine, it was 1.11 cents, and on the Maine Central 1.05 cents. Properties of the type of the Union Pacific, operating in the far western territory, report averages considerably higher than those shown by the coal-carrying roads, but not as high as the figures attained by properties in New England. Thus the Atchison reports an average of .99 cent, the Southern Pacific 1.01 cents, the Union Pacific .97 cent, and the Rock Island .96 cent. In the Southern States higher rates generally obtain. The Central of Georgia reported for

the decade an average of 1.09 cents, the Atlantic Coast Line 1.28 cents, and the Seaboard 1.13 cents. Rates on the Louisville & Nashville and the Southern Railway ranged considerably lower.

A fractional change in transportation rates, especially in freight, may make a vast difference in the operating results and gross and net income of a railroad property. If a railroad, the operating costs of which must naturally increase with increasing costs of materials and advancing wages, cannot maintain its freight rates or cannot raise those rates in some sort of ratio to the advancing costs of operation, it is apt to be in a very bad way indeed. A difference of one or two mills per ton per mile on the average freight tonnage of a railroad during the year, may add or deduct millions of dollars from the aggregate gross business. An illustration of the effect of changing freight rates is well shown in the record of the Baltimore & Ohio during the recent years. For the year ended June 30, 1900, the average rate per ton per mile on the Baltimore & Ohio was .45 cent. In 1909, this rate had been increased to .58 cent, an advance of nearly 30 per cent over the rate received in the earlier year. The freight earnings of the system for the year 1909 amounted to \$58,355,112. If the freight rates in 1909 had been no higher than those reported for 1900, the amount of the freight earnings in money would have been (other things being equal) not more than \$37,000,000, which of course would mean that the net profits might have been nearly \$10,000,000 lower than they were and that the road would not only have been

unable to pay dividends, but it would have had difficulty in meeting its fixed charges. The Baltimore & Ohio record is an extreme case of the effect of changing freight rates in recent years, as the rates twelve or fifteen years ago on the road were abnormally low and it was chiefly due to this latter fact that the road was forced into the hands of receivers.

But nearly all properties doing a large interstate business with heavy freight traffic were obliged to face the problem of low freight rates twenty years ago. In the '90s the railroads of the country, as a whole, were not getting enough out of their freight traffic to meet their obligations and pay fair dividends on invested capital, and when, in the last years of that decade, prices of all sorts of materials used by railroads began to advance and wages also tended upward to a moderate extent, the railroad systems were obliged to make some definite move looking to an improvement in the rates received for freight transportation. Out of this situation grew what was known as the "community of interest" movement. Led by Mr. Cassatt, President of the Pennsylvania Railroad, the large systems began acquiring stock interests in competing or semi-competing lines, not necessarily with a view to controlling these lines absolutely, but chiefly for the purpose of promoting harmonious relations and mutually agreeing from time to time on changes in rates to conform with the changing prices of materials and other operating costs. Thus the Pennsylvania acquired heavy interests in the Norfolk & Western and Chesapeake & Ohio and also in the Baltimore & Ohio.

The Baltimore & Ohio in its turn acquired its stock interest in the Reading lines, while the Reading held stock in the Erie, the Lehigh Valley and other roads. The New York Central interests also purchased holdings in the Baltimore & Ohio and the Reading, while in the Far West the Hill and Harriman groups made various stock investments looking to harmonious traffic relations in their respective territories.

The effect of this general movement toward a community of interests was of far-reaching importance in maintaining the stability of freight rates. To it can be traced the success during recent years of properties like the Baltimore & Ohio, Chesapeake & Ohio, and the Reading, while a large proportion of the successful record made by other great properties such as the Pennsylvania and New York Central is also a direct result of it. It is a matter of record that the moderate changes in freight rates on the Pennsylvania Railroad's directly operated lines, which were shown between 1899 and 1903, amounting to about 20 per cent. in the rate, have made a difference in net earnings on the Pennsylvania Railroad of something like \$7,000,000 per year, equalling, therefore, over 1½ per cent. on the present outstanding stock.

While operating costs and the requirements for general efficiency in railroad properties have steadily increased during the past thirty years, the tendency of both passenger and freight rates has been almost steadily downward. It is only during the past eight or ten years that there has been any cessation in this trend. As already pointed out, this tendency has become more

serious with the advancing costs of operation. It is, therefore, all the more necessary that railroads show efficiency in operating their properties if they are to produce results of sufficient amount to make proper net returns for the benefit of their stock and bondholders.

The entire problem is bound up with the question of the cost of carrying a ton of freight a given distance. In other words, it is a question of ton-mile cost. The ton-mile cost can only be reduced, on the average, by highly efficient methods of operation, and if this cost advances it only means that the railroad property will make less money for its security holders. Ton-mile cost cannot be kept down unless the road is kept up. That is to say, a railroad company cannot afford to "skimp" on the maintenance of its property for any length of time, or to curtail its legitimate expenses in order to make an apparently good showing of profit per ton per mile. Its only hope is to increase the density of its business and to get a larger volume of results out of a given piece of work. Railroad managers realize this and the effort in all successful fields has been concentrated in this direction for more than a decade.

The general trend on Eastern railroad properties of freight and passenger rates during the past thirty years is well brought out by the following figures, showing the average rates per passenger mile and per ton-mile on the Pennsylvania Railroad from 1881 to date:

YEAR	Passenger Rate per passenger-mile cents	Freight Rate per ton-mile cent	YEAR	Passenger Rate per passenger-mile cents	Freight Rate per ton-mile cent
1881.....	2.15	.86	1896.....	1.96	.56
1882.....	2.25	.87	1897.....	1.95	.53
1883.....	2.30	.88	1898.....	1.93	.50
1884.....	2.26	.80	1899.....	1.94	.47
1885.....	1.95	.69	1900.....	1.98	.54
1886.....	2.11	.75	1901.....	1.99	.58
1887.....	2.12	.73	1902.....	2.00	.59
1888.....	2.09	.69	1903.....	2.03	.60
1889.....	2.08	.69	1904.....	2.00	.61
1890.....	2.08	.65	1905.....	2.01	.59
1891.....	2.05	.66	1906.....	2.01	.59
1892.....	1.98	.63	1907.....	1.92	.58
1893.....	2.00	.61	1908.....	1.97	.57
1894.....	1.98	.58	1909.....	1.96	.58
1895.....	1.95	.56	1910.....	1.96	.58

It will be noted that the change in freight rates during the thirty years has been far more pronounced than the change in passenger rates. As nearly three-quarters of the business transported on the Pennsylvania Railroad is freight, the vital factor is the rate per ton per mile received for freight traffic. In the thirty years under review, we note an almost steady decline in this rate, the only upward turn being the moderate trend since 1899. In 1883, the rate received per ton per mile was nearly double what it was in 1899, and over 35 per cent higher than the rate received last year. Now, if we examine the net profits of the Pennsylvania Railroad for each year since 1883 we will note an upward trend per mile of road in these net profits for practically the entire period.

Considered in relation to these freight rates this fact is remarkable enough in itself, and is an eloquent demonstration of the steadily increasing operating efficiency of the Pennsylvania property during the period. With freight rates which are little more than half what they were thirty years ago, the Pennsylvania Railroad is now able to show a larger amount of profit per ton per mile than was the case at the earlier date. This has not been accomplished by cutting down given costs, which as a matter of fact have greatly increased, but entirely by "intensive development" in the business. Every act connected with the operation of the property has, on the average, shown a greater proportionate result. It is like the case of a mechanic who is paid at the beginning \$2 a day and produces results worth to his employer \$2.50 per day, but who, after some experience, increases his efficiency so that his employer pays him willingly \$4 per day for the execution of work worth to the employer \$6 per day. The tonnage carried on the Pennsylvania Railroad in 1883, at .88 cent per mile, did not in the aggregate produce a result equivalent to the freight transported with the same amount of effort in 1910, for which the rate received was but .58 cent per mile.

The same analysis of freight rates can be applied to any other railroad system in the country. In many cases it will be found that efficiency has not been developed to the same extent as on the Pennsylvania system, and the success or failure of railroads, especially within the past ten years, is quite closely bound up with this question of ton-mile cost and relative rates received. On the

Erie the ton-mile cost is low and the ratio of profit between this cost and the rates received has been during recent years all that could be desired. On the New York Central this statement can be made with less positiveness, while in New England, the results shown by the New Haven property do not demonstrate any such development of a low ton-mile cost as do roads like the Pennsylvania, or the soft-coal-carrying properties. Of course, roads of the type of the New Haven, with a heavy local traffic and large passenger business, usually have a wide margin of profit per ton per mile to fall back upon, and the necessity for minimizing their ton-mile cost is not so urgent.

The Income Factors

XVI

Earnings and Their Distribution

Having examined the physical sides of the railroad property, analyzed its location, its classification of traffic, its management, equipment, general operating efficiency, and the rates received for service performed, we may then turn to its income results, and analyze the actual showing made from year to year, in dollars and cents.

Like all other figures in the railroad report, income accounts can only be examined satisfactorily in a comparative way, and the only method by which intelligent comparison can be made is through reduction to the mileage basis. And in considering relative results with other properties the only practical method, as in comparison of physical characteristics, is to compare roads situated in the same general territory, of the same general characteristics, and doing the same general character of business. It will be realized that these comparative results are always to be taken with proper qualifications, as there are often, even in the cases of properties of very similar type, certain cardinal differences which necessarily make great changes in results and fully account for facts which, other things being equal, might strongly affect the final judgment passed upon a property.

While in certain final results every railroad in the United States can be intelligently compared (as, for example, we can compare the margin of safety shown over fixed charges by the Pennsylvania with the margin shown by the Louisville & Nashville or the Atlantic Coast Line, or the percentage of gross business on the net capital of any of these lines, and make use of these comparisons as an intelligent guide), yet when we come to compare the relative results as shown in the gross business or receipts per mile of two railroad systems, we cannot, unless we take into consideration the type of territory and the class of tonnage and other traffic, get the best results, and if no other factors are considered, the comparisons thus made might lead to very absurd conclusions. Thus, one might say that the New York, Susquehanna and Western, which in 1911 reported an average in gross operating revenue of \$16,891 per mile, made a better showing than the Great Northern, which reported for the same period gross operating revenue of \$8,456 per mile; whereas, as a matter of fact, the Great Northern made a far better relative showing than the other and, in fact, a better relative showing than most other railroads in the United States. Similarly, we sometimes see it stated in the offering of securities, that a certain railroad is "earning \$12,000 or more per mile, while the average gross receipts of all the railroads in the country were last year but \$10,722 per mile," thus implying that the road on which the securities are offered is in a superior position in respect to earning capacity. Now, while this may or may not be true in a given case, such

a statement as this demonstrates absolutely nothing. The Chicago Great Western in 1907 earned \$11,174 per mile, considerably more than the average shown by all American railroads in 1908, but this fact was no argument at all in favor of the financial strength or value of the securities of the Chicago Great Western, which went into receivers' hands and could not meet its fixed charges. The Seaboard reported average gross receipts for the decade ending with 1908 only about 10 per cent below those of the Colorado & Southern, but while the former went into receivers' hands the other was in a position of high credit and great financial strength.

These qualifying factors in matters of location, etc., should be borne in mind in any plan adopted for the comparative showing of results in the different properties. Thus, transcontinental lines in both the East and West should be directly compared, "Granger" lines should be compared, soft and hard coal systems should be examined comparatively, southern properties should be compared one with another, while those where local traffic predominates, such as the New England roads, should be considered relatively. In general, the bases for comparison should be grouped about as follows:

1. Soft-Coal-Carrying Systems:

Baltimore & Ohio.
Chesapeake & Ohio.
Hocking Valley.
Toledo & Ohio Central.
Norfolk & Western.
Northern Central.

Buffalo, Rochester & Pittsburgh.
Lake Erie & Western.
Philadelphia & Reading.
Wheeling & Lake Erie.
Kanawha & Michigan.
Western Maryland, etc.

In addition, other properties, which, like the Pennsylvania Railroad and some of its western lines, the Lake Shore and the New York, Chicago & St. Louis, the traffic of which is made up in substantial proportion by soft coal, should be given relative consideration with these soft-coal roads.

2. Crop-Carrying Systems:

Atchison, Topeka & Santa Fé.	Northern Pacific.
Union Pacific.	Chicago & North Western.
St. Paul.	Canadian Pacific.
Burlington.	Minneapolis & St. Louis.
Rock Island.	Chicago Great Western.
Missouri Pacific.	Colorado & Southern.
St. Louis & San Francisco.	Omaha, etc.
Great Northern.	

The same systems which are grouped in the general class of crop-carrying roads should be compared for other reasons. In many cases they have similar characteristics of other kinds. Thus, the Atchison and Union Pacific, though depending upon crop prosperity to some extent, have developed other traffic of a very diverse nature during the past decade, and also depend to a very great extent on a heavy volume of miscellaneous through traffic, which becomes more of a factor with every year. The Canadian Pacific, although deriving a large part of its revenue from the moving of the crops of the great Northwest, is a transcontinental line, operating from ocean to ocean, and doing business in practically every part of the Dominion of Canada from Halifax to the Pacific. But in general, volume of business of all the roads may be judged by the standards set.

3. Eastern Trunk Lines:

Pennsylvania Railroad.	Erie Railroad.
New York Central.	Pittsburg, C. C. & St. Louis.
Lake Shore & Michigan South- ern.	Baltimore & Ohio.
Pennsylvania Company.	Wabash.
	C. C. C. & St. Louis, etc.

The Erie, although an "anthracite coaler," is, like the Baltimore & Ohio, also a trunk line, and therefore is to be compared with properties of both types. As already pointed out, the same policy should be followed in relation to the Baltimore & Ohio; and, in fact, any of the larger properties with branches and connections extending far beyond their special fields, as do those of the Baltimore & Ohio and the Erie, must be compared with these qualifying facts distinctly in mind. It is only in cases like that of the Hocking Valley, the Wheeling & Lake Erie, Kanawha & Michigan or the Pittsburg & Lake Erie, where the systems are confined within a certain area, and where the dependence on one line of tonnage is preponderating, that the comparisons can be made without qualification.

4. "Anthracite Coalers":

Philadelphia & Reading Rail- way.	Delaware & Hudson.
Central Railroad of New Jer- sey.	New York, Susquehanna & Western.
Lehigh Valley.	New York, Ontario & Western.
Lackawanna.	Erie Railroad.
	Lehigh & Hudson River, etc.

A system like the Reading, which does the largest anthracite coal business of the group, may also be intelligently compared with the soft coalers, and with prop-

erties like the Pennsylvania or the Baltimore & Ohio, both of which rely on soft-coal traffic to a considerable extent. For the Reading system has increased its soft-coal tonnage 160 per cent since 1899 and this now constitutes about 44 per cent. of its entire coal-carrying tonnage. Also, a road like the Lackawanna, which, while doing a heavy hard-coal business, has likewise developed during the past decade a very heavy miscellaneous and trunk-line business and a large passenger traffic, must be compared with the coalers with these qualifications in view, and can also be fairly and intelligently compared with the New York Central and the Pennsylvania.

5. Eastern & New England Groups (short haul traffic predominating):

New York, New Haven & Hartford.	Bangor & Aroostook.
	Long Island.
Boston & Maine.	West Jersey & Seashore, etc.
Maine Central.	

6. Southern Groups and Systems:

Atlantic Coast Line.	"Queen & Crescent Route."
Central of Georgia.	Atlanta & West Point.
Seaboard Air Line.	Georgia Southern & Florida.
Southern Railway.	Louisville & Nashville.
Alabama Great Southern.	Nashville, Chattanooga & St. Louis, etc.
Mobile & Ohio.	

7. Central Western Systems:

Chicago & Alton.	Chicago, Indianapolis & Louisville.
Illinois Central.	
Toledo, St. Louis & Western.	Vandalia Railroad.
Chicago & Eastern Illinois.	Cincinnati, Hamilton & Dayton, etc.
Wabash.	
C. C. C. & St. Louis.	

8. Southwestern and Far Western Systems:

Southern Pacific Lines.	Missouri Pacific.
Texas & Pacific.	Rock Island.
Missouri, Kansas & Texas.	St. Louis & San Francisco.
Kansas City Southern.	Denver & Rio Grande.
St. Louis Southwestern.	

As in the case of the anthracite coalers and many other properties, the distinctive characteristics of the systems often "dovetail" and overlap, and it is, therefore, of advantage to compare results very often between two properties in comparatively distinct territories, making due allowance for the known differences in traffic, density of population, alliances, connections, etc.

That the volume of gross business on a given railroad cannot be conclusively judged by comparing the total shown per mile with the average earnings per mile of all railroads in the country, can be easily demonstrated by examining the average showing made by different systems in the several groups referred to above. The average gross business of all the railroads reporting to the Interstate Commerce Commission in the fiscal year 1911 was \$11.589 per mile and the net per mile operated (before deducting taxes) was \$3.631. The showing made by the leading individual roads in 1911 in gross and net income per mile of road was as follows:

	Gross Operating Revenue.	Net Operating Income.
1. Soft-Coal Carrying Systems:	1911	1911
Baltimore & Ohio.....	\$19,880	\$5,690
Chesapeake & Ohio.....	14,618	4,841
Hocking Valley	20,492	7,351
Northern Central (1910).....	27,290	4,316
Norfolk & Western.....	18,031	6,389
Buffalo, Rochester & Pittsburgh.....	15,941	5,212
Toledo & Ohio Central (1909).....	9,322	3,056
Lake Erie & Western (1910).....	6,223	1,373
Wheeling & Lake Erie.....	14,870	4,500
Kanawha & Michigan.....	17,717	6,891
Western Maryland	13,261	5,085
2. Crop-Carrying Systems:		
Atchison, Topeka & Santa Fé.....	\$10,393	\$3,556
Union Pacific	13,325	5,868
St. Paul	8,650	2,412
Burlington	9,730	3,155
Rock Island	8,533	2,421
Great Northern	8,456	3,294
Canadian Pacific	9,668	3,408
Northern Pacific	10,909	4,307
Minneapolis & St. Louis.....	4,960	1,529
Chicago Great Western.....	8,394	2,123
Colorado & Southern.....	7,849	2,707
Omaha	9,233	3,112
3. Eastern Trunk Lines:		
Pennsylvania Railroad (1910).....	\$40,349	\$11,149
New York Central (1910).....	26,396	6,824
Lake Shore & Michigan Southern (1910)..<	29,718	8,688
Pennsylvania Company (1910).....	38,256	12,040
Erie Railroad	24,923	7,901
Pittsburg, C. C. & St. Louis (1910).....	27,657	7,281
Wabash	11,844	2,990

4. Anthracite Coalers:

Philadelphia & Reading Railway.....	\$43,753	\$17,738
Central Railroad of New Jersey.....	39,118	16,719
Lehigh Valley	26,317	9,749
Lackawanna (1910)	44,236	18,932
Delaware & Hudson (1910).....	24,237	9,769
New York, Susquehanna & Western.....	16,891	6,451
New York, Ontario & Western.....	16,423	4,885
Lehigh & Hudson River.....	15,174	5,777

5. Eastern and New England Groups:

New York, New Haven & Hartford.....	\$30,439	\$11,094
Boston & Maine.....	19,980	4,340
Maine Central	9,729	2,703
Bangor & Aroostook.....	5,134	1,892
Long Island (1910).....	29,440	7,955
West Jersey & Seashore (1910).....	16,928	3,923

6. Southern Groups and Systems:

Atlantic Coast Line.....	\$7,036	\$2,488
Central of Georgia.....	6,739	2,030
Seaboard Air Line.....	7,187	2,404
Southern Railway	8,569	2,751
Alabama Great Southern.....	14,492	3,969
Mobile & Ohio.....	10,051	2,953
Georgia Southern & Florida.....	6,074	1,444
Louisville & Nashville.....	11,742	3,804
Nashville, Chattanooga & St. Louis.....	10,019	2,475

7. Central Western Systems :

Chicago & Alton.....	\$14,335	\$4,074
Illinois Central	13,273	3,739
Toledo, St. Louis & Western.....	8,375	2,597
C. C. C. & St. Louis.....	15,349	3,446
Chicago & Eastern Illinois.....	12,713	4,077
Chicago, Indianapolis & Louisville.....	10,043	3,132
Vandalia Railroad	12,731	2,888
Cincinnati, Hamilton & Dayton.....	9,381	2,129

8. Southwestern and Far Western Systems:

Southern Pacific	\$12,325	\$4,812
Texas & Pacific.....	8,687	2,177
Missouri, Kansas & Texas.....	8,607	2,503
Kansas City Southern.....	12,087	4,341
St. Louis Southwestern.....	7,995	2,217
St. Louis & San Francisco.....	8,319	2,667
Missouri Pacific	7,295	1,306

It will be noted that there is a vast difference in the amount of business done by different railroads in different sections, and, therefore, the only intelligent comparison which can be made must take into consideration the type of territory and kind of tonnage transported. The Chesapeake & Ohio, transporting freight at a rate per ton per mile of .42 cent, can make money because it is doing a gross business of over \$14,000 per mile with very "low-grade" freight which can be handled generally at unusually low costs. With this volume of business it makes more money per mile of line operated (\$4,841 in 1911) than the St. Paul with an average freight rate of .84 cent per mile (nearly double) could make in the same period. The St. Paul, with a traffic density less than one-fourth that of the Chesapeake & Ohio, however, was able to make (in 1911) \$2,412 per mile on a gross business of \$8,650 per mile, showing that with this difference in freight rates, about 30 per cent of the St. Paul's business was *profit*, while only about 31 per cent was profit on the enormously heavier business done by the Chesapeake & Ohio. If the Chesapeake & Ohio could have done business on the basis of the freight rates enjoyed by the St. Paul, on a volume of business equaling

that of last year, its net profits might have been in the neighborhood of \$7,000 per mile instead of \$4,841, while if the St. Paul, with the same gross business of \$8,650 per mile had received but .42 cent per ton per mile its net profit would probably not have reached \$800 per mile.

As a general proposition, therefore, it will be seen that in order to make a favorable showing for their security holders, the coal-carrying roads, of both the anthracite and soft-coal type, must, entirely regardless of their capitalization and fixed charges, do a far heavier business at far lower cost per unit than those carrying grain or other agricultural products; that Eastern roads, carrying miscellaneous traffic and operating in settled territories, must do more business per mile of line than those in the Southern or Western States, and that all roads in which "through" business predominates must normally report heavier gross earnings than those in which local traffic is the most important factor. All of which once more emphasizes the importance of considering thoroughly the relationship of the Physical Factors to the Income Factors in the railroad business.*

* As arranged in "Moody's Analyses" the Income Factors are grouped immediately after the Physical Factors and the same principles of comparison are followed in every case. A 10-year record is furnished of every operating railroad or system where obtainable; averages are struck to show the position of the property in the 10-year results, and these averages are compared with like averages of four other properties of similar type and characteristics. The table presented is in effect, an Income Account of the road for every year of the decade, all the vital figures being included and reduced to the average mileage basis, thus showing the actual earning power and income results, as well as the distribution of the income earned for every year embraced in the review.

XVII

The General Income Account

The income account of a railroad, which in condensed form is found in every railroad report and is usually made the most prominent feature, embraces the following items:

1. Operating revenues (gross earnings):
2. Operating expenses:
 - a. Maintenance of way and structures;
 - b. Maintenance of equipment;
 - c. Transportation expenses;
 - d. Traffic expenses;
 - e. General expenses.
3. Net operating revenue (or net earnings).
4. Outside operations.
5. Net operating income.
6. Income from investments and other sources.
7. Total net income.
8. Fixed charges:
 - a. Taxes;
 - b. Interest on funded and floating debt, etc.;
 - c. Equipment charges;
 - d. Hire of equipment, etc.;
 - e. Rental charges;
 - f. Miscellaneous items.
9. Net income (or surplus).
10. Dividends paid.

11. Surplus beyond dividend requirements.
12. Appropriations for improvements, betterments, etc.
13. Balance carried to profit and loss.

Certain changes required by rulings of the Interstate Commerce Commission (chiefly of a minor nature, however) have affected the comparative results shown by the railroads in the last few years. Thus, where formerly the roads often followed a policy of charging such items as "hire of equipment" in operating expenses, they are now required to state these items separately and may include them under the general head of "fixed charges." The same fact is true of taxes. Formerly many roads included taxes in their operating expenses, though usually stating the actual amounts separately. The revised method is, generally speaking, a great improvement over the former, and enables the investigator to gauge the actual results with much more accuracy than was formerly the case.

XVIII

The Operating Revenues (or Gross Earnings)

The operating revenues of a railroad are the gross *operating* receipts from rail transportation; that is to say, the gross amount of money received from the actual moving of trains, and do not include any receipts from sources outside of the railroad operation itself. These sources of operating revenue are classified as follows:

- a. Earnings from freight traffic;
- b. Earnings from passenger traffic;
- c. Earnings from express traffic;
- d. Earnings from transportation of mails;
- e. Earnings from miscellaneous transportation.

Freight traffic is, of course, the great income-producing source of American railroads, and it is this item which is to be watched most closely by everybody. Taking the American railroads as a whole, we find that for the year ended June 30, 1910, the proportion of freight business to all traffic (in dollars, not tonnage or density) was 70.00 per cent. Passenger traffic represented 22.87 per cent; express, mails and miscellaneous, 4.41 per cent, and "revenue from operations other than transportation," 86 per cent. Only a very few large railroads doing an interstate business report a freight business of less than

55 per cent of the total business done. One of these is the New Haven, where the average for 1910 was 50 per cent, and another the Long Island, which reported but 32 per cent in freight business for the year 1911.

On the other hand, we find numerous important railroads reporting a preponderance of freight traffic far above the average mentioned. The Pittsburg & Lake Erie (controlled by the Lake Shore) reported in 1911 an average of 88 per cent, the Ontario & Western 79 per cent, the Buffalo, Rochester & Pittsburg 85 per cent, the Lehigh Valley 80 per cent, and the Great Northern 74 per cent.

In examining the gross earnings of any railroad the questions of freight rates, train-load and freight density will assume importance in direct ratio to the proportion of freight traffic represented in the total business of the road. One would give more consideration to these matters on the Buffalo, Rochester & Pittsburg and the Great Northern than on the Long Island or the New Haven; one would know that, if a road which formerly carried a smaller proportion of freight to the total traffic is showing over a long period a definite trend in the other direction, the freight traffic questions are assuming relatively greater importance. The Missouri, Kansas & Texas in 1902 reported 77 per cent for freight traffic, but in 1911, 63 per cent was the figure shown. Obviously, the passenger traffic is tending to become a matter of more vital importance on this line, and if this trend continues a few years more it will have to be considered more closely than has been the case in recent years. The

Chicago & North Western record shows that whereas in 1902 the freight traffic represented 72 per cent of the whole, by last year it had fallen to 65 per cent. These figures, showing the trend, either upward or downward, for all the railroads in the country, can be examined and the proper deductions made therefrom, if the investor has the necessary figures at hand.

Even a cursory examination of the exhibits of American railroads will indicate the remarkable changes which have occurred during the past ten years in practically the entire railroad field, as far as gross earnings per mile are concerned. And unlike increases in operating costs, this vast growth in income has not come about as a result of advancing rates, for the prices charged by the railroads for freight transportation have, on the average, advanced but fractionally during the decade, while the passenger rates have as a whole advanced not at all, and in numerous instances have declined. The enormous expansion in earnings and profits shown by many manufacturing industries and by the "industrial trusts" generally, have been in large degree the results of advancing prices as well as steady increases in population and, therefore, in markets for goods. But while the railroads have had the benefit of movements in population and the advancement of industry generally, as well as of the steady opening up and development of natural resources, they have all made their records in earnings during the decade without the opportunity for increase to any extent in the rates charged for handling tonnage. Isolated instances, like that of the Baltimore

& Ohio and the Chesapeake & Ohio, may be cited, but it should also be remembered that the rates charged by these roads at the present time represent advances from "cut-throat" levels, and even as they stand to-day are not in any degree higher than the rates obtained a generation ago. In 1889 the Baltimore & Ohio rate was .59 cent; to-day it is .58 cent. The Chesapeake & Ohio in 1894 reported a rate of .48 cent; last year it was .42 cent. The Atchison in 1890 received 1.23 cents per ton-mile; last year it received but 1.03 cents.

Comparing the representative railroad systems of the country in the matter of changes in gross operating revenue per mile in recent years, we get some strikingly interesting figures.

Name of Road.	Gross operating revenue per mile:	
	1902.	1911.
Atchison	\$7,528	\$10,393
Atlantic Coast Line.....	4,868	7,036
Louisville & Nashville.....	9,238	11,742
Baltimore & Ohio.....	14,905	19,880
Boston & Maine.....	13,954	19,980
Canadian Pacific	4,942	9,668
Central of Georgia.....	4,200	6,739
Chesapeake & Ohio.....	10,212	14,618
Burlington	6,634	9,730
Colorado & Southern.....	4,925	7,849
Chicago, Milwaukee & St. Paul.....	6,906	8,650
Chicago & North Western.....	8,098	9,706
Cincinnati, New Orleans & Texas Pacific....	16,846	27,479
Delaware, Lackawanna & Western (1901-1910)	30,481	44,236
Denver & Rio Grande.....	7,259	9,162
Erie Railroad	17,833	24,022

Great Northern	6,864	8,456
Kansas City Southern	6,543	12,067
Lehigh Valley	17,500	26,317
Missouri, Kansas & Texas	6,556	8,607
Missouri Pacific System	6,600	7,295
Lake Shore (1901-1910)	20,746	29,718
C. C. C. & St. Louis (1901-1910)	9,454	15,349
Illinois Central	9,546	13,273
Michigan Central (1901-1910)	7,591	16,470
New York, New Haven & Hartford	21,467	30,439
Norfolk & Western	10,466	18,031
Northern Pacific	8,246	10,909
Pennsylvania Railroad (1901-1910)	27,602	40,349
Pennsylvania Company (1901-1910)	20,812	38,256
Pittsburg, C. C. & St. Louis (1901-1910)	17,264	27,657
Philadelphia & Reading	29,083	43,753
Central Railroad of New Jersey	25,865	39,118
Rock Island	7,278	8,533
Southern Railway	5,592	8,659
Union Pacific	8,166	13,325
Southern Pacific	9,012	12,325
Wabash	7,815	11,844
Wheeling & Lake Erie	8,002	14,870

The foregoing systems represent a large percentage of American railroad mileage, and the trend in gross receipts for all American railroads is well reflected by the results here shown. There has been a wide diversity in the relative increases, some roads reporting a doubling of gross revenue per mile, while others have reported a more modest increase.

The second important division in the gross operating revenue of the railroad is the passenger business. In 1910, as shown by the report of the Interstate Commerce

Commission, the proportion of passenger business done by the railroads of the country was 22.87 per cent of the whole. Like the freight traffic, passenger traffic varies on different lines, roads transporting coal and other minerals with a heavy freight density usually showing a much lighter passenger business than others. With such roads, therefore, the passenger rate is not so vital a factor as it is on lines like the New Haven and New York Central. The rates for passenger traffic on the soft-coal roads are usually higher than the average, while on the trunk lines, where a good deal of through traffic in passenger business is present, the rates tend to much lower levels. Averaged as a whole we find that passenger rates throughout the country are in the neighborhood of 2 cents per passenger per mile, but on the New York Central the rate has averaged during the past decade only 1.76 cents, while on the Pennsylvania it has been 1.99 cents. Where a road has the benefit of a good deal of local traffic the rate, of course, generally averages somewhat higher.

While the passenger traffic as a whole is a minor factor, yet it is quite as essential that fairly profitable rates should be received by the roads for this class of business as for the freight transportation. Experience shows that most of the roads cannot do a profitable passenger business unless they can average in the neighborhood of 2 cents per mile for their returns in this department. The records show that as a general thing during the past ten years passenger rates have tended to decline fractionally, and this means that this

falling tendency must soon be arrested or many roads will be carrying on their passenger business at a positive loss.

On the New Haven and New York Central properties the return from passenger business should be closely watched. In the aggregate the gross revenue from these sources runs into many millions of dollars, and a decline of 10 per cent in the average rate would mean a serious curtailment of their operating revenue and, therefore, a falling off in the surplus made available for charges and dividends.

The other sources of gross revenue represent but a small proportion of the total business of the average railroad. Little need be said in relation to the earnings from express business and from the transportation of United States mails. The rates for this class of traffic are stable and in the main profitable, but as shown by the record, less than 7 per cent of the entire operating revenues of the railroads of the country was last year represented in transportation of this type.

Earnings from miscellaneous traffic generally include those smaller items which cannot well be classed under the other heads. Sometimes this miscellaneous operating income amounts to a considerable total, as in the case of the Pennsylvania Railroad in 1910, when \$2,364,353, about 2 per cent of the total operating revenues, was reported under this head. But as a general thing the smaller roads report little or no "earnings from miscellaneous traffic."

Before turning to an examination of operating ex-

penses, attention is called to the fact that most roads receive more or less income, or incur some net loss from "operations outside of transportation." Prior to June 30, 1907, such operations were generally included in the gross operating revenues (or gross earnings), but the Interstate Commerce Commission now requires these operations to be reported in detail separately. Further comment is made on this subject in the chapter entitled "Outside Operations."

XIX

The Maintenance Accounts

The most important items which require careful examination in the department of operating expenses are the Maintenance Accounts. The fact that the railroad is normally a moving property, and that its very existence depends upon never-ceasing action in all its parts, makes the question of "up-keep" a most vital factor at all times. Unless a railroad keeps its mechanism in constant repair and continuously offsets the effects of the steady depreciation which results from intense wear and tear, its operating efficiency is soon gone, and its earning power inevitably deteriorates. This latter fact is true even if all sorts of favorable circumstances, such as growth in population, development of natural resources, improved traffic connections or other matters, take place on its lines. And not only is it vital that proper amounts of money should be spent on the property regularly for its maintenance, but it is equally important to know where this money comes from—whether it is appropriated out of earnings or whether capital obligations are created to supply it.

The policy adopted by most railroads in this country in recent years has been to appropriate out of gross

earnings for maintenance from 20 per cent to 35 per cent, dependent upon the needs of the property as related to the gross business which it is doing. There is no such thing as a fixed "scientific" ratio between operating costs as a whole or gross receipts as a whole, although such a theory has been frequently asserted. The appropriations for maintenance on a railroad property must necessarily be made as a result of experience on that property and on properties of like type and doing a like character of business, but one has no more right to say that 30 per cent of the gross income per mile should be continuously spent for maintenance on a given property, regardless of other considerations, than to say that a railroad operating on a basis of 75 per cent of its gross business is in better condition and better managed than some other railroad which is operating on a basis of 55 per cent. And yet we see such statements made constantly, and prices of securities have often been fixed for a time by the wide exploitation of this theory. For many years the Great Northern was subject to criticism because it steadily operated for less than 55 per cent of its gross business, and the prediction was freely made ten or fifteen years ago that it could never be permanently successful unless more money was spent per mile in doing the business which it was doing. But in spite of this theory the Great Northern, while continuing to operate at low relative cost, went through a phenomenally successful career, and is to-day in as good condition both physically and in a traffic-producing sense, as any system in its section of the country.

Maintenance costs, like all other items in the railroad report, are to be judged relatively to other things—to the showing made in the same items in prior years, and to the showing made in the same matters by other railroads of like type operating in like territory. Consequently, railroads with double tracks must spend more for maintenance of way than those having single tracks; roads doing a heavy volume of business, as reflected by the freight-density figures and the train-load, will need to spend more for maintaining their equipment and also their trackage than those of lighter business. The Canadian Pacific, for example, doubled its freight density within the decade under review, thus indicating a very heavy increase in its volume of business and, consequently, an increase in the wear and tear of both trackage and structures as well as of equipment. It met this increase in the wearing-out process by appropriating \$2,555 per mile for all maintenance costs in 1911 as compared with \$1,534 per mile in 1901. Considered relatively to the traffic density on the Canadian Pacific, this expenditure for maintenance in recent years is probably fully as high, as far as requirements are concerned, as was the expenditure of \$5,901 per mile on the Baltimore & Ohio last year.

The Maintenance Expenses are grouped, as already pointed out, in two divisions—Maintenance of Way and Structures, and Maintenance of Equipment. The different items coming under these heads are, briefly stated, as follows:

Maintenance of Way and Structures includes all ex-

penses for repairs of roadway and track, for repairs and renewals of machinery and tools, for ballasting, for repairs and renewals of switches, ties, fences, bridges, culverts, stations, shops, and other structures used in the business of transporting freight and passengers.

Maintenance of Equipment includes all expenses for repairs and renewals of all freight and passenger cars, locomotives, company cars, other railroad equipment of a movable nature, and the maintenance of shop machinery, etc.

In judging the maintenance-of-way expenditures of a given line, the physical characteristics must in all instances come in for careful consideration. If a railroad is obliged to maintain extensive sidings and terminals in addition to its ordinary trackage, it is obvious that it should spend more than a railroad of the same type in other respects which does not have these characteristics. If the road is doing a single line of business of the type of the Detroit & Mackinac, with light density, comparatively small wear and tear, and has no terminals or extra trackage to keep up, it need not spend nearly so much per mile as would otherwise be necessary. The Detroit & Mackinac spent in 1911 only \$502 per mile in maintenance of way, and averaged for the decade only \$553 per mile. Yet this small amount has apparently been sufficient to maintain the property at as high a standard as has been necessary for its type of business, and relatively is probably as good as the New York Central's average for the decade of \$2,934 per mile. In fact, the maintenance-of-way expenditures on the railroads vary

all the way from the nominally low showing of the Detroit & Mackinac to the totals shown by the Pittsburgh & Lake Erie a few years ago of more than \$15,000 per mile.

The same observations hold in relation to the maintenance-of-equipment costs. The small Detroit & Mackinac can thrive on an average expenditure for the decade in this item of only \$495 per mile, while the heavily equipped Lackawanna requires an average of \$4,473 per mile, or nearly ten times as much.

In the light of the 10-year records presented in "Moody's Analyses," the maintenance expenditures for both way and equipment can be judged very fully. As a rule, very fair comparison can be made between properties located in similar territory, and although the figures cannot always be accepted as accurate guides, as so many qualifying factors enter in to affect the result, yet where there has been a definite lack of proper maintenance expense, or where more has been included in this account than the conditions or requirements would seem to warrant, the fact can be readily detected. In a general way it can be stated that a normal average of \$1,000 to \$1,500 per mile should be spent for maintenance of way on western or southern lines, where practically all the mileage is single track, while the ordinary trunk lines should spend from \$1,500 to \$2,000 in the same department. In maintenance of equipment, the matter of mileage and type of territory does not govern to the same extent, and the relationship of the costs to the traffic density for both passen-

gers and freight is much closer than in the other maintenance items. The figures showing changes in equipment owned can be profitably compared in connection with the maintenance-of-equipment items, as obviously, if the equipment owned is increasing in relation to the mileage operated, the maintenance-of-equipment costs should increase in proper ratio also.

Two important factors affecting vitally the maintenance expense records of American railroads during the past decade should not be overlooked. One of these is the policy which was followed by many railroads during the years of unusual prosperity prior to 1907 of charging into maintenance accounts many large items which really represented improvements and betterments to the property and which normally would not appear there. Charges of this kind have been labelled "concealed earnings," and it is well known that heavy amounts have been spent in this way in many instances. For example, the vast amounts spent for maintenance on the Pittsburgh & Lake Erie, aggregating in the one year of 1903 no less than \$27,738 per mile, were to the extent of possibly 65 per cent not "maintenance" expenses at all, but actual expenditures for construction and the purchase of entirely new equipment, etc. The Lake Shore, the Lehigh Valley, the Pennsylvania and its separately operated lines, the Lackawanna, the Southern Pacific, and the Union Pacific—all of these roads were spending, in the years immediately prior to 1908, important sums for betterments which were charged into the operating costs in one way or another.

This practice has had two normal results. First, it has made the comparative record appear to disadvantage when examined in connection with the results which have more recently been shown by raising the 10-year average a little above the true expenditure for maintenance for the decade. Second, it has put many of the roads in a position of exceptional strength, where they have found it comparatively easy in a depressed condition like the present to make enormous curtailments in maintenance expenses for a time without running the risk of seriously depreciating the efficiency of their properties. This was precisely the position of the Baltimore & Ohio, the Pennsylvania, the Atchison, the Union Pacific, and the Southern Pacific in 1910 and 1911. Superficial criticism was rampant for many months regarding the so-called policy of the Union Pacific in currently "skinning the road" in order to make a good net showing for its stockholders. There is nothing in this point of view and would not be until the road had continuously followed this policy of retrenchment for a much longer period of time than it has done. In recent months the Union Pacific maintenance cost have tended to rise radically again.

The other factor which should be borne in mind in an examination of maintenance expenses of the railroads for the last decade (and indeed equally in any other operating or improvement costs) is the great increase which has taken place in the prices of all materials used by the roads. This fact, coupled with that of the rise

in wages (which on the average are from 10 to 15 per cent higher than ten years ago), has naturally resulted in making it more expensive for a railroad to maintain a given mile of line and a given amount of equipment than was possible in 1902. If a railroad spent \$1,000 per mile then for the up-keep of its line, it probably has to spend not less than \$1,300 to-day for precisely the same amount of maintenance. This fact should in no case be overlooked. It indicates for one thing that the amounts of "concealed earnings" in some properties have not been as great as generally supposed and it also implies that a railroad which, like the Iowa Central, reported the same figure for maintenance per mile in 1908 as it did in 1899, was really not doing as much in the former year in maintaining its property as it was twelve years ago.

XX

Transportation and Other Operating Expenses

Prior to the adoption of the uniform accounting system in force since June 30, 1907, the railroads usually classified their expenses outside of maintenance under the general head of "Conducting Transportation and General Expenses." This general head has been subdivided by the ruling of the Commission into "Transportation Expenses, Traffic Expenses, and General Expenses," while expenses of outside operations are now included in an entirely separate account. For discussion of the latter see chapter on "Outside Operations."

As a railroad's traffic density increases, the cost of conducting transportation must necessarily rise, but barring increasing costs of labor and service it should not radically change except in some relationship to changes in gross business and traffic density. If a road's density is increasing and its gross earnings are showing expansion, a tendency to keep down transportation costs is usually a sign that efficiency is being developed. Of course, transportation costs will grow as gross business increases, but such costs should not grow in as great a ratio. On the other hand, with traffic den-

sity standing still or declining, and gross business falling off, operating costs of this character should decline also, though not necessarily to the same extent. As in any other business there is a level below which operating costs cannot go. Certain expenses are fixed if the railroad is to operate at all, and often we find the case of a small road which for extended periods will be operated at an actual loss, while more than one large system is burdened with controlled or leased lines which are carried along from year to year by the parent company in the face of constantly recurring deficits. This is another fact which goes to emphasize the importance of making the railroad "work for its board." It cannot stand still, for then it is worthless, while if it keeps moving it must develop sufficient traffic to earn its operating costs, in default of which it is usually worse than worthless.

Generally speaking, if a railroad is showing a record of stability in its traffic and a heavy train-load, the costs of conducting transportation will tend to consume a less percentage of its gross receipts than otherwise. The Norfolk & Western reports an average of about 37 per cent of its gross business as consumed in operating costs, while the New Haven averages about 48 per cent. The train-load on the former has averaged for the decade 561 tons, while on the New Haven the average has been but 245 tons. On the Great Northern, with its train-load average of 497 tons, the percentage has been below 30 per cent, while on the Missouri, Kansas & Texas reporting an average train-load of 216 tons, the figure

on transportation expenses exceeds 45 per cent of the gross.

In examining the relative amounts of transportation expenses on different properties and showing their relationship to the general efficiency of operation, as reflected in the density and the train-load, the strength or weakness of a property is clearly brought to the light. If a property like the Norfolk & Western, with a long record for stable traffic and a steadily growing growing train-load, consumes only 37 per cent of its gross receipts in carrying on its business (operating its trains) it is clearly in a much stronger position than the Missouri, Kansas & Texas, which consumes 45 per cent in the same way. In the event of a pronounced depression, if the gross business of the Norfolk & Western fell off 30 per cent, it could still, with a moderate curtailment of maintenance expenses, continue the full operation of its property and easily carry its charges. But should the gross business of the Missouri, Kansas & Texas fall away to like extent, even with a very drastic cutting of maintenance costs, it would probably fall far short of earning its full charges.*

* The point may be here raised that the Norfolk & Western would be at an advantage because of its relatively lower charges, which is true. But it would be found that with charges relatively the same, the Missouri, Kansas & Texas would be in a far weaker position than the Norfolk & Western. See comment on "Fixed Charges and the Margin of Safety" for demonstration of the close relationship between the percentage of fixed charges and the operating costs of the railroad.

Brief reference only need be made to the other classification heads of operating expenses, viz., Traffic Expenses and General Expenses. Traffic expenses cover such items as the wages and salaries of those in charge of traffic, such as traffic managers, freight, passenger and ticket agents, etc., outside agencies, expenses of advertising, expenses of conducting industrial and immigration bureaus, etc.

General expenses embrace the salaries and expenses of executive officers, clerks and accountants; cost of general supplies, legal expenses, insurance, relief and pension departments, general administration of joint tracks and terminals.

XXI

Outside Operations

Outside operations, or operations of the railroad company other than transportation, is a new account which has been added since 1907 under the accounting requirements for railroads of the Interstate Commerce Commission. Prior to the foregoing date, the gross revenue from such operations was generally included in the "miscellaneous operating revenues" of the company, and the costs of operation of these outside activities were charged in the general operating expenses, as "miscellaneous costs." This was unsatisfactory because it tended to hide actual results in this department of the railroad's business, and there were doubtless many cases where operations of this kind, which were a continual loss to the company, were entirely unknown to the bondholders and stockholders.

Included in the classification of "outside operations" are the following items: Boat and Ferry Lines; Harbor Terminal Transfers; Electric Railways; Express Lines; Cab and Omnibus Service; Sleeping Car and Parlor Car Service; Dining Car and Restaurant Service; Grain Elevators; Stock Yards; Telegraph and Telephone Lines; Amusement Parks and Resorts; Cold Storage Plants, etc.

All large railroad systems have more or less outside

activities of these kinds; many operate their own railroad restaurants; some carry on their own sleeping-car, parlor-car and dining-car service, a considerable number operate ferries and other water lines. Thus the results from these activities may materially change the net-income showing for the stock- or bond-holders, and the facts regarding the profitableness of such business should of course be clearly shown in the annual reports.

Sometimes these outside operations steadily show a loss, but this may be no reason why they should be discontinued. There are usually vital reasons why these services are carried on, and indirectly they are supposed to contribute to the general earning-power of the railroad operation itself. For example, the Pennsylvania Railroad does a large business in these outside matters and last year reported total revenues of \$5,976,385. But the cost of carrying on these outside businesses was not directly profitable, as a net deficit was reported for the year of \$1,309,388. Any one would be foolish to say, however, that the Pennsylvania Railroad should for this reason abandon its ferries, restaurants, boat lines, harbor-terminal transfers, etc. If it followed this policy, much of its passenger and freight business would soon be diverted to competing roads which continued to do these same things.

All railroads, however, do not report a net deficit in their outside operations. The New York, New Haven & Hartford last year reported a net profit of \$1,398,338, and the Delaware, Lackawanna & Western a net profit of \$210,756.

XXII

Net Operating Revenue (or Net Earnings)

The net earnings or net operating revenue of the railroad is the amount left over from gross receipts after all expenses of operation, including maintenance, have been deducted. It is, in other words, the amount of profit actually earned by the railroad as a result of its operations. It does not include any important profit or net income from sources outside of the actual results brought about by the moving of trains, although before the present accounting system required by the Interstate Commerce Commission was in force, certain items from outside operations were not separately classified.

While the net earnings of the railroad show its net profit-producing power as a railroad, there are very few cases where the net earnings represent the entire income of the property which is made available from year to year for the payment of fixed charges and dividends. Practically all American railroads have outside income in the shape of interest or dividends on investments in controlled and separately operated lines which adds to the general income of the property and gives the road an increased amount each year with which to pay its obligations, distribute dividends, or make improvements.

The net operating revenue of a railroad can only be properly examined and analyzed after due consideration has been given to the costs of operation and the maintenance. If a railroad is not spending enough for the maintenance of its property or is economizing in too drastic a way in its methods of conducting transportation, its net earnings may appear to be very much heavier than the true circumstances warrant. Investors often examine the net earnings of a property before looking at anything else, and if a road has shown an increase of 10 per cent in its net earnings over the figures of the previous year, the assumption is at once made that the showing is better than was the case the former year and, therefore, that its securities are stronger. But this does not necessarily follow at all, as the road may very easily have so handled its accounts and so cut down its operating costs that the net results shown will not reflect the true condition of the property. This method has been followed many times in past years by railroad companies, the controlling interests of which were desirous of paying large dividends for a period or enhancing the market prices of the stocks or bonds. The only way in which a railroad can show a proper increase in net revenue for a given period is to increase its gross business or density and currently spend a sufficient amount of this gross revenue in maintaining the property at a certain standard of efficiency and on a certain basis of operation. Temporarily a road may curtail its operating costs to face a period of declining earnings, if it has previously spent sufficiently liberal

amounts to enable it to do this with safety. But where a railroad has over a period of years put less into its maintenance or its transportation costs than has really been necessary, it is then in no position, in the event of a depression, to radically reduce these costs in greater ratio than the fall in gross receipts, in order to make a good showing in net operating profit.

It is in considering this feature of railroad results that a 10-year comparative record such as is given in "Moody's Analyses" proves of exceptional value. Properties like the Pennsylvania and the Lake Shore are easily shown to be in a pre-eminent position for temporarily curtailing their costs, while those like the Chicago & Alton and Denver & Rio Grande are not in such position. This being the case, any pronounced increase in net receipts shown by the latter systems in the face of large declines in gross earnings is to be specially watched by the holder of the securities of these lines. It simply means that if such a policy is continued for any length of time the roads will have to expend large sums of new money for the rehabilitation of their properties, and that the general efficiency for economical operation will be seriously curtailed.

As shown on a previous page, the net operating revenues of the different railroads, as reduced to the mileage basis, show as great variation as does the gross revenue per mile. While the average net receipts per mile of all railroads in the country were in 1911 a little over \$3,600, the showing made by different systems varies all the way from \$500 per mile to more than \$10,000

per mile. Like comparisons of other figures showing the relative condition of properties in their net operating receipts are to be considered mainly in connection with roads of similar type and operating in similar territory.

XXIII

“Other Income” and Total Net Income

Nearly all American railroads have important sources of income aside from that of the direct operation of their properties. In many cases this income is a factor of great importance, and represents a very substantial proportion of the total amount of money made available each year for interest and dividend uses. The following exhibit shows the average amounts per mile for the year ending June 30, 1911, of Total Net Income of the important railroads of the United States, with the percentages stating what proportion of the whole is represented by actual earnings derived from the operation of the property itself and what proportion is derived from “other sources.”

NAME OF ROAD	Average Total Net Income Per Mile	Proportion derived from operation	Proportion derived from other sources
Atchison	\$3,769	92%	8%
Atlantic Coast Line.....	3,191	72	28
Louisville & Nashville.....	3,992	95	5
Baltimore & Ohio.....	6,795	84	16
Boston & Maine.....	4,692	92	8
Canadian Pacific	4,133	83	17
Central of Georgia.....	2,472	82	18
Chesapeake & Ohio.....	5,541	87	13

Chicago, Burlington & Quincy.....	3,395	90	10
Chicago, Milwaukee & St. Paul.....	3,992	61	39
Chicago & North Western.....	3,224	88	12
Delaware & Hudson.....	12,651	77	23
Delaware, Lackawanna & Western.....	24,771	77	23
Denver & Rio Grande.....	3,625	81	19
Erie Railroad	9,642	82	18
Great Northern	3,674	90	10
Hocking Valley	9,537	76	24
Illinois Central	5,218	72	28
Kansas City Southern.....	4,500	96	4
Lehigh Valley	10,918	90	10
Missouri, Kansas & Texas.....	2,631	95	5
Missouri Pacific	1,555	84	16
New York Central.....	10,873	63	37
Lake Shore	14,986	58	42
New York, New Haven & Hartford.....	15,689	71	29
Norfolk & Western.....	7,049	90	10
Northern Pacific	5,206	83	17
Pennsylvania Railroad	15,088	74	26
Pennsylvania Company	21,152	57	43
Pittsburg, Cincinnati, Chicago & St. Louis	7,488	97	3
Reading Company	21,805	81	19
Rock Island	2,444	99	1
St. Louis & San Francisco.....	3,116	86	14
Southern Railway	3,219	85	15
Toledo, St. Louis & Western.....	3,029	86	14
Chicago & Alton.....	4,076	100	..
Texas & Pacific.....	2,233	97	3
Union Pacific	8,623	70	30
Southern Pacific	5,479	90	10
Wabash	3,315	90	10

It will be noted that this percentage of "other income" has varied on the leading lines of the country,

all the way from nothing on the Chicago & Alton to 43 per cent on the Pennsylvania Company. The New York Central shows 37 per cent and the Union Pacific 30 per cent.

The "other income" of the railroad is made up of various items, some representing interest on bonds and stocks held for investment, some representing rental of tracks, rental of equipment, some representing receipts from controlled lines on division of earnings, etc. The Pennsylvania Railroad reported its "other income" for the year 1910 as consisting of the following amounts and items:

Interest and dividends on securities owned.....	\$14,999,876
Interest and dividends on securities of United New Jersey R. R. and Canal Co.....	174,456
Hire of equipment.....	362,510
Interest, General Account.....	1,226,947
Profits from sundry accounts.....	94,326
Rents	600,732
Total	\$17,458,847

It will be seen that the most important item in the above statement is "Interest and dividends on securities owned," and this will be found to be the case with the majority of "other income" accounts of the railroads. Obviously, the question to be determined, then, is what are these investments on which the road is receiving income? Are they securities of other railroads or are they outside properties of some kind?

The answer to this question leads the investigator in many directions. But the question of the sources of

the "other income" is, on many roads, fully as vital as that of the operating income itself. Examination of railroad reports will divulge the fact that many of the railroads depend, in large degree, on their "other income" for the payment of their dividends; and in numerous cases, even a portion of the surplus used for meeting interest and sinking-fund payments comes from the "other income." To cite an instance, we find that the New York Central in 1910 earned (in net), from all operations, the sum of \$25,710,613; but its "total net income" (from which sum its interest and dividends were paid) was \$41,156,946, showing that its "other income" for this one year aggregated no less a sum than \$15,446,333. Reference to that company's statement will show that the amount paid out in dividends by the New York Central in 1910 was \$13,363,758, and that this amount nearly consumed all the surplus remaining after fixed charges, taxes, etc. (amounting to \$26,868,374), had been taken care of. In other words, the New York Central depended entirely in 1910 on its "other income" to pay its dividends, and without this "other income" could have paid no dividend whatever.

Now, where did this "other income" come from? From dividends and interest on securities owned; from interest on money loaned, and from sundry miscellaneous profits. The Lake Shore & Michigan Southern, 90 per cent of the stock of which is owned by the New York Central, paid 18 per cent in 1910, and this made up a large part of the New York Central's "other income." The Michigan Central, which is controlled in

the same way, paid 8 per cent on its stock, and this made up a substantial part of the other income, much of the balance being accounted for by payments made to the New York Central by a large number of smaller lines and companies, in which it has either a minor or important interest; and from many other small and less important items.

The "other income," then, is a source of revenue entirely distinct from that received from the operation of the property, and yet, as is shown in many cases, it is a factor of vital importance in the general result for the period. Consideration of the other-income figures leads, in the first place, to a direct examination of the balance sheets of the company, where the "investment" account is carried. As other income consists chiefly of returns on securities owned, it is at once important to know what these securities consist of and at what valuations they are carried in the balance sheet of the company; in other words, is the return on them sufficient to justify the company to carry them at a certain value? Again examining the New York Central report, we find that the "securities owned" were carried on the balance sheet of that company in 1910 at a valuation of \$131,557,710. The "other income" for that year was, as already shown, \$15,446,330. But a large part of this sum was made up of special items, such as interest on loans, sundry profits, etc., and the actual amount of money received by the company in direct return from its securities owned was about \$12,000,000, which was something more than 9 per cent on the valuation shown.

This showing indicates that the investments held by the New York Central were not overvalued as related to income, for the year 1910.

But this does not finish the matter. It may be that while the investments held yielded a return of over 9 per cent in actual dividend or interest payments for the year, they were undervalued for other reasons, or overvalued, as the case may be. For example, while the Lake Shore paid into the New York Central but 18 per cent on its stock in 1910, it actually showed a surplus equal to over 25 per cent on its stock, a large portion of which went back into the property in the shape of betterment and improvement expenditures. And if we run back a few years in the record of the Lake Shore we will find that for a long period it has been steadily earning each year a heavy surplus above the amounts disbursed in dividends to the parent company. The logical conclusion from this exhibit is that the equity owned by the New York Central in the Lake Shore property is heavily in excess of the value placed upon that equity in the balance sheet. And further, to follow the showing made by the Lake Shore in its available surplus for dividends, we are led immediately to examine the Lake Shore's sources of income. Total Net Income of the Lake Shore in 1910 was \$14,986 per mile, of which \$8,688 was derived from net earnings and the balance from "other income." Now, what did the "other income" of the Lake Shore consist of? Like that of the New York Central, it is represented chiefly by dividends and interest on investments. So we are led to examine the

balance sheet of the Lake Shore, note the approximate return on these investments, and examine in turn the properties there represented.

Thus it will be seen that the "other income" question tends to lead us far afield, especially where a large railroad system is being examined, and where many controlled lines are represented. The Lake Shore's "other income" is derived from returns on investments in the C. C. C. & St. Louis, the Pittsburg & Lake Erie, the New York, Chicago & St. Louis, and other properties, all of which have their own income accounts, their own liabilities, and their own investments.*

One other important point connected with the "other income" and investment valuations of the various systems should not be overlooked. While, as shown in the case of the New York Central, the return on all investments in 1910 was only about 9 per cent, the fact must be remembered that this was the *average* return on the aggregate investment holdings. These investment holdings are made up of a large number of items, some of which are yielding the company (as in the case of the Lake Shore stock) far more than the average rate of 9 per cent, while a considerable number are yielding nothing at all. The latter may be of the value given because of other reasons—strategical or potential. The holding of Rutland stock was of no income value, but it may have been regarded as of great strategical value.

* Under the ordinary method of analyzing security values, a thorough following-out of facts like these has been extremely difficult, but the plan followed in "Moody's Analyses" for analyzing the different systems is so arranged that it can be accomplished in practically all cases with great simplicity.

And in many cases it will be found that the control of a branch line operates as a traffic feeder to a very important extent. Further consideration is given to this matter in the chapter on Capitalization Factors.

XXIV

Fixed Charges and the "Margin of Safety"

Briefly stated, the fixed charges of a railroad consist of the following important items:

- (a) Interest on funded debt.
- (b) Interest on floating debt.
- (c) Rentals.
- (d) Sinking funds.
- (e) Interest and principal of car and equipment trusts.

Other items of a miscellaneous and usually minor nature are often included under the head of fixed charges in addition to the above, and frequently taxes are also included under this head. Prior to the adoption of the uniform accounting system, taxes were sometimes embraced in operating expenses, sometimes in fixed charges, and sometimes stated separately. The present requirement is, however, that all taxes be stated separately from both operating expenses and fixed charges.

The uniform accounting requirements have also provided that the roads separately state such items as "Hire of Equipment," etc., and in some instances these are items of material importance. Prior to 1908, such items as hire of equipment were spread over the operating expenses of the different roads in a number of ways. The term "hire of equipment" refers to the charges

made by one road against another in the exchange of their equipment in the course of business. Sometimes this results in a net loss to a line and sometimes a profit; but whether a loss or a profit, the balance as shown in the income account is designated the same.

Taken as a whole, the fixed charges of a property represent the sum it must currently earn and pay to be in a healthy financial condition. The reports usually state the items of fixed charges in satisfactory detail and the investor can, therefore, easily judge of their nature. It is frequently the case that a railroad has car or equipment trusts outstanding, which mature serially, a portion of the principal as well as interest being payable each six months or each year. Items of this nature must naturally be included in the charges just as sinking-fund payments are; and often they are of such amount as considerably to increase the sum total of the charges in a given year.

The relationship of the fixed charges to the property can best be judged comparatively, and when they are examined over a series of years the figures are of vast use. There is a direct relationship between the gross business and general traffic density of a property and the percentage of this business required for meeting the charges. As has been well brought out by Mr. Mundy in his excellent book, the "Earning Power of Railroads," those roads the fixed charges of which have averaged not more than 30 per cent of the gross income have usually been able to withstand financial setbacks with much greater ease than roads with fixed charges greatly ex-

ceeding this figure. Therefore, properties like the Lake Shore and the Great Northern, which have spent liberal sums for the maintenance of their properties and for the development of an intensive traffic, thus keeping down the ratio of operating costs aside from maintenance, have been in better position to carry their charges than some other roads which, while showing advances in earnings from year to year, have been obliged to consume a larger proportion of the gross receipts in operating their trains.

But the vital question with the holder of bond issues on railroads, is to know what amount of money remains available after payment of all operating and other current expenses for meeting the interest on the bond issues in which he may be interested. Assuming that he has examined the operating and income records in his report in thorough manner and has ascertained the relationship of the traffic density to the gross business, maintenance and other costs, and has also properly examined the sources of outside income, he is on solid ground for ascertaining the position of the bond issues in the results shown by the road. But while it is a matter of interest to know what amount of available surplus a road has shown over its charges this year or last year, the more important thing is for him to know what the road has done in this regard for a series of years.*

*This thought has been carried to fuller development in "Moody's Analyses" than has ever been attempted before. The available surplus above the charges of the different roads is not merely shown for two or three years, but is shown for an entire decade. In this way the investor is able to ascertain the trend of improvement or retrogression for a long series of years. In order to reach a fair basis of judgment the records for each year are averaged and the average showing made is the basis on which the entire property is analyzed. Comparisons are made as usual with the average results shown by other properties.

The Margin of Safety is the *proportion* of Total Net Income remaining over after payment of all current fixed obligations, including taxes, car trust principal and interest payments, miscellaneous items, etc. For example, if the total net income of a given road was last year equal to \$10,000 per mile, and the fixed charges were \$6,000 per mile, then the remainder of \$4,000 per mile (or 40 per cent) is the margin of safety. It is interesting to note that the great majority of American railroads have presented comparatively high margins above their charges during the entire decade, and that in most cases a steady record of improvement has been shown from year to year.

Generally speaking, the smaller the percentage of Total Net Income required for the payment of the charges on the property, the stronger will be the position of the bond issues of that company. Roads like the Great Northern, Pennsylvania, Atchison, and Union Pacific can withstand enormous setbacks in earnings and profits without jeopardizing the position or value of their bond issues to any real extent. But where a railroad system is obliged to pay out from 70 to 80 per cent of its net earnings, or surplus, to meet its fixed obligations, a very moderate falling-off in gross business will entirely wipe out whatever surplus it may have shown. Cases in point are the Wabash, the Missouri Pacific, the Rock Island, etc. A glance at the records will show that for the entire period under review all of these properties reported a very low margin of safety. During the eighteen months following the panic of 1907

many roads suffered a 20 to 25 per cent decline in gross earnings. Now, if a road operating at a ratio of 66 per cent of its gross business, and requiring 42 per cent of this gross business for transportation and traffic expenses (running its trains), at the same time carries fixed charges which consume an average of 70 per cent of its net earnings, it will, unless it has important outside sources of income, be in a very bad way if business falls off 25 per cent. The outcome would probably be about as follows:

	Normal business.	25 per cent decline.
Gross operating revenue.....	\$10,000,000	\$7,500,000
Operating expenses:		
Maintenance	2,400,000	1,500,000
Transportation expense, etc.,....	2,400,000	1,500,000
	<u>4,200,000</u>	<u>3,000,000</u>
Net earnings	\$3,400,000	\$2,300,000
Fixed charges	\$2,300,000	\$2,300,000
Surplus	\$1,100,000	
Margin of safety.....	33%	

Thus it will be noted that with a falling off in gross receipts of 25 per cent there would be a logical drop in net earnings of at least 33 per cent, while the surplus or margin above charges would have been completely eliminated, and the strength and position of the bond issues would have been greatly weakened.

The point may be raised that under such conditions the road could curtail its operating costs to a greater extent than shown. As far as maintenance is concerned,

it could probably do this for a time (and in the illustration the pronounced cut has been made here), but it might have considerable difficulty in cutting down its other operating costs to a much greater extent. A railroad must move its trains, and this is the field of expense where the chances of curtailment are smallest. A 15-per cent curtailment might be about all that it could stand, but in maintenance it might effect a saving for a time of 50 per cent. If it did this its margin might for a time be held above 10 per cent, but only for a time, unless a revival of business set in.

On the other hand, take the case of a road operating at the same ratio, but with maintenance costs representing 34 per cent of the gross, transportation costs consuming but 32 per cent, and with fixed charges consuming but 30 per cent of the net earnings.

	Normal business.	25 per cent decline.
Gross operating revenue.....	\$10,000,000	\$7,500,000
Operating expenses:		
Maintenance	3,400,000	2,100,000
Transportation expense, etc.....	3,200,000	2,700,000
Net earnings	\$3,400,000	\$2,700,000
Fixed charges	1,020,000	1,020,000
Surplus	\$2,380,000	\$1,680,000
Margin of safety.....	70%	62%

In the first example we have a road which is in no condition to withstand a setback in earnings. Its operating costs are such that they cannot be radically reduced

without seriously depreciating the earning capacity of the property; its maintenance costs form the smaller part of its operating expenses, and the maintenance accounts are the ones that are most elastic and can therefore be curtailed farthest in the event of emergency. Added to this, its fixed charges require in normal times two-thirds of the income, and in hard times they consume it all. The other road operates at low comparative cost; its traffic is heavier and it makes more per unit of service; it spends more for maintenance and it requires a far less proportion of its net profits to meet its charges. Types of this latter instance are the Norfolk & Western, Lehigh Valley, etc.

The point may be made that the comparisons are not fair, as one road started with relatively lower fixed charges than the other. But viewed over a long period (and that is the only way to view railroad results), we will find that the Norfolk & Western attained its present strong position over a series of years, not by starting with low fixed charges and, therefore, a high margin of safety, but by developing its volume of business, increasing the profit per unit of service, and thus, while expanding its gross revenue, reducing the ratio of its operating or transportation costs (running of trains). The margin of safety on the Norfolk & Western bond issues twenty years ago was but 31 per cent, while its transportation costs at that time consumed 38 per cent of its gross revenue. To-day the margin exceeds 55 per cent, and the transportation expense in 1911 was but 33 per cent of the gross income received. The same

facts apply, to less extent, to the record of the Baltimore & Ohio during the past decade.

Nothing reflects the inherent stability of the great majority of American railroads at the present time so well as the Margin of Safety records, as shown for the past ten years. They are a graphic display of the remarkable trend toward improvement in earning power and financial stability which has characterized at least 80 per cent of the great railroad systems of this country since the depression of the '90s. The record is the more remarkable for the fact that this has all been achieved in the face of either falling or stationary passenger and freight rates and in the midst of almost steadily advancing costs for labor and materials. Of course, the fact is not to be overlooked that the growth of the country in wealth and population during the decade, thereby developing new traffic to enormous extent, is at the base of this record as far as growth of the transportation business is concerned. But the almost steady improvement from year to year, in operating efficiency, in forcing from the same effort greater results, is a testimonial of the highest kind to modern American railroad management as a whole. Operating management of superior type is at the base of the Margin of Safety record shown over the decade by such properties as the Lehigh Valley, the Southern Pacific, the Pennsylvania, the Atchison, and the Louisville and Nashville. With a management no more efficient than that of the Missouri Pacific during the past decade, the Atchison could not have shown the results it has recently been showing;

while if the Missouri Pacific, with its low capitalization and fixed charges, had been under an Atchison management during the past ten years it might be fully as easy for it to pay a dividend to-day as it is for the Atchison.

XXV

Disposal of Surplus

Theoretically, at least, the surplus shown by a railroad above its fixed charges is supposed to be available for dividends, and we often see it heralded far and wide that such and such a road is showing a surplus of, or "earning," 10 to 15 per cent upon its stock. But like many another statement on which stocks are sold and market prices are manipulated, such a report often proves to be a delusion and a snare. Because a railroad has shown a surplus in its income account of 10 per cent upon its stock, it does not necessarily mean that it has that amount available for dividend purposes or, in fact, that it has anything for such uses. In the past, railroads have frequently reported book-keeping surpluses of vast amount, and yet have had immediately to borrow money for current uses. In 1907 the Missouri Pacific reported a surplus above its charges *and dividends* of nearly \$4,000,000 for the year, and in 1909 its balance sheet showed a surplus of accumulated income (presumably) of nearly \$10,000,000. And yet the Missouri Pacific was obliged to discontinue dividends with the close of 1907, and in February, 1908, borrowed \$6,000,000 on its two-year notes at 5 per cent. Numerous other instances of the same type might be mentioned.

In the past, especially, many railroads followed the policy of keeping down their current operating costs, including maintenance, but at the same time spending the necessary money on their properties, and then, at the close of the year, deducting from the surplus shown above charges, the amounts currently spent but not currently charged up. So that in the final result they would really have no surplus at all, and the item "surplus above charges" or "surplus above dividends" would simply be a book-keeping entry.

This practice may or may not be reprehensible. The real situation can only be judged in connection with the actual operating and maintenance expenses shown. If a railroad is not charging a proper amount of maintenance, but is holding up items which properly belong there and deducting them from surplus at the end of the year as "betterments and improvements," then the method is certainly misleading. It is one of the strong arguments in favor of the uniform accounting requirements that railroads coming under the jurisdiction of the Commission cannot do this any longer. They are now required to charge to maintenance the items which properly belong there and can only put in improvement or betterment accounts the actual expenditures of such nature. On the other hand, if, as in the case of properties like the Lake Shore, Pennsylvania and a host of others, full charges have been regularly made to maintenance, then the charging up of additional amounts after payment of all current obligations and dividends reflects

great credit on the management, and adds to that extent to the efficiency and value of the property.

But even if no sums are being currently charged up to improvement accounts from surplus, this is no reason why a road should uniformly follow a policy of paying out all its surplus in dividends. As with any other business, a railroad should, to be conservative, accumulate a surplus and lay aside for a rainy day. The roads which did this in the highly prosperous years of 1900 to 1907 were in much stronger position to face the panic and the depression which followed than those which, like the Erie and the Southern, made dividend payments which largely consumed their current surplus every year. The New Jersey Central, the Lackawanna, the Reading, the Atchison, the Northern Pacific, and the St. Paul did not have to go into a tight money market in the winter of 1907-08 and borrow millions on short-time notes at high rates of interest to keep themselves afloat. They had conserved their resources simply by refraining from the policy of paying out the great sums they were making in dividends. The Pennsylvania had almost uniformly followed a policy for more than forty years of paying out only about one-half to two-thirds of its surplus from year to year in dividends, and most of its affiliated lines are doing the same. So that as a matter of fact it makes a very substantial difference to the bondholders of a road as well as the stockholders what is done with the surplus remaining after their demands have been satisfied. A bondholder will be better off if the surplus is not disturbed entirely; a preferred holder

will be in a stronger position if the surplus remaining after his dividend has been paid is not all paid out in common stock dividends. Thus the bondholder and the preferred stockholder have a vital interest in where the balance of surplus goes to. Six years ago the Erie first preferred holders may have said they need not concern themselves about the way the second preferred holders were being handled, but, as a matter of fact, it was of vital importance to them to know just what was being done with these junior holders. When the panic came Erie was in trouble at once, and the first preferred holders found themselves in the same boat with the junior class—no dividends for anybody.

Stockholders in railroads are too apt to assume, if a given percentage of surplus is shown, as for example 6 per cent, that they are justly entitled to receive all or nearly all this amount in dividends. This is a mistaken idea. Too many roads have come to grief in the past by following a policy of over-liberal dividend disbursements. A careful distinction should be made between the amounts of surplus shown which are really necessary to retain as working capital commensurate with the normal growth in the needs of the company, and the amounts which may fairly be disbursed in dividends. Because a railroad twenty years ago, with a very light business, required a reserve of only a nominal amount, this is no reason why to-day, with ten times the business, and ten times the uses for working capital, it should continually cripple itself by paying out nearly all its surplus earnings in dividends. The merchant, as his volume of business

grows, steadily increases his bank balance and general reserve, and a railroad should do the same.

The items listed in railroad reports under improvements usually represent many charges. Many roads have special improvement and betterment accounts; others have simply charged the amounts spent directly, that is, for so much extending, building, so much new equipment, etc. There has been no fixed rule in the matter. The Lake Shore, New York Central, and some others have in the past, charged their improvement costs up before deducting dividends, thus showing, technically, but a narrow margin of surplus above dividend payments.

The Capitalization Factors

XXVI

The Assets and Liabilities of the Railroad

No other question in connection with the railroads has agitated the public mind during recent years as has that of the capitalization of the roads. It is held in many quarters that the railroads of the United States are enormously over-capitalized; that half their bonds represent speculative values and most of their stocks water. The truth of this assertion is dependent upon what we mean by "water." Measured by earning capacity (the ability to show profits) it can be shown that, as a whole, the American railroads are not over-capitalized at all. If we may say that a given piece of line, extending from New York to Buffalo, which cost \$1,000,000 to construct fifty years ago, is now over-capitalized because it carries bond issues aggregating \$100,000,000 and stock equalling half as much again, then we must agree that the whole world is in a state of "over-capitalization." But we have already seen that the key to railroad values is earning capacity and nothing else. A line of road stretching from New York to Buffalo, which was not operating railroad trains and transporting passengers and freight between those points

to-day would be worth but little more than it was fifty years ago. Whatever increased value it might have now over that of 1862 would be in the right of way it owned. But under such conditions it would not be a railroad and such value would not be railroad value, but realty value. It would be a realty company, and might be worth a few millions more than it was at the beginning. But if we measure the value by ability to pay interest or profit on capital, then we get at the meat of the capitalization question; at least, from the investors' standpoint. Putting our hypothetical railroad to the test of the earning power of fifty years ago, we should probably find that on a capitalization of \$20,000 per mile it earned hardly 6 per cent. But put the same line of road to the test of the earning power of to-day and we should find that on a capitalization ten times as heavy per mile, it would be earning far more than 6 per cent. In 1863 (forty-nine years ago) the Delaware, Lackawanna & Western reported a total capitalization of about \$37,000 per mile. On this capital the net earnings in that year were slightly in excess of 7 per cent. In the year 1910, the same railroad reported a total capitalization, including that of its leased lines, of over \$164,000 per mile, and, after deducting investments from its balance sheet, the net capital per mile was still more than \$130,000. On this latter figure the total net income of the road in 1910 was no less than 19 per cent. On the basis of earning power, then, the Lackawanna was in 1863 over-capitalized to the extent of nearly 250 per cent as compared with its net capital

per mile to-day. To put the Lackawanna on the basis of its capitalization of 1863, we should have to increase the figure to over \$424,000 per mile.

The average capitalization in par value of stocks and bonds of American railroads was, for the year 1910, \$18,417,132,238, or about \$80,000 gross per mile. Of this amount \$8,113,657,380 was represented by stocks and about \$10,303,474,858 by bond obligations. In other words, the American railroads as a whole were borrowing \$10,303,474,858 at various rates of interest. These borrowings embraced every kind of interest-bearing obligation, from the ordinary straight mortgage bond to the temporary loan and short-term note. The bond obligations, it will be noted, represented considerably more in par value than the stock issues. But a substantial part of this capitalization was owned by the railroads themselves, thus reducing the amounts outstanding in the hands of the public to \$5,526,991,778 of stocks and \$8,811,584,162 of bonds; a net total of \$14,338,575,949 or \$62,657 per mile.

The general contention is made, by those who have given thought to the subject, that the replacement value of the American railroads as a whole would be pretty fairly represented by the par value of the total bonded debts outstanding, and it is believed that a "physical valuation" of railroad property would confirm this point of view; thus showing that railroad stocks as a whole, represent "water."

But any "physical valuation" such as has thus far been suggested, would take into account the apprecia-

tion in the value of rights of way, terminal sites, etc., and the value of these latter things would doubtless be found heavy enough to cover the entire stock capitalization, if not a great deal more. In fact, independent valuations have already been made by certain of the railroad corporations themselves, and in all cases where this has been done, it has been shown that "physical valuation" is really in excess of total par values at the present time.

All of which simply demonstrates that "value" in railroad property is measured by earning power and nothing else. Should the legislation of the future, however, proceed upon the principle that the "un-earned increment" in rights of way and terminal sites is not to be regarded as the property of the railroad and therefore should not be capitalized, we would then find that the great majority of stocks of railroad corporations would be practically worthless. For in such an event, capitalization would no longer be based on earning power, but merely on replacement value.

Such legislation may come about in time, but for the present at least the time worn custom of capitalizing earning power in corporate forms will undoubtedly continue.

XXVII

The Balance Sheet

Taken as a whole, probably the most important individual statement in the railroad report is the balance sheet. No definite idea can be gained of the property from its financial standpoint without the balance sheet, and if no other figures were given to the shareholders, this, at least, would be of some assistance to them. A balance sheet is a statement of the company's assets and liabilities, and as presented publicly it is usually in very condensed form. That is to say, while it contains a large number of distinct items, these items can usually be classified under a few heads and in the statements as submitted to stockholders only the total amounts belonging under each head are given. It is therefore sometimes difficult properly to analyze a balance sheet thoroughly, but in the case of the capital assets and liabilities this can usually be done with a fair amount of accuracy, as these are almost always large items and are quite clearly stated.

It should be remembered, however, that the value of a balance sheet, like every other statement in the railroad report, is chiefly relative, and an examination of it without regard to income and operating results is of no particular use.

A railroad's balance sheet contains the following definite heads:

ASSETS.

1. Capital Assets.

- (a) Property Investment, or "cost of road and equipment."
- (b) Investments in securities and other properties.
- (c) Sinking funds, etc.

2. Current Assets.

- (a) Cash on hand and on deposit.
- (b) Loans and bills receivable.
- (c) Accounts receivable.
- (d) Due from other companies and individuals.
- (e) Due from company's agents and officers.
- (f) Advances to other companies.
- (g) Sundry items.

LIABILITIES.

1. Capital Liabilities.

- (a) Stock issues outstanding.
- (b) Bond issues, including mortgages, real estate obligations, car or equipment trusts, etc.
- (c) Other permanent loans, notes, etc.

2. Current Liabilities.

- (a) Loans and bills payable.
- (b) Accounts payable.
- (c) Payrolls and vouchers.
- (d) Interest and dividends accrued.
- (e) Due to other companies.
- (f) Sundry items.

The balance remaining, after the offsetting amounts shown on both sides in the above items, is known as "profit and loss," and may be either on the assets or

liabilities side, as the case may be. If on the liability side, the profit and loss item is known as surplus; if on the asset side it is a deficit.

Theoretically, at least, the current assets and liabilities are supposed to approximately offset each other. In very few cases do they actually do this, but unless the amount of such items as cash on hand and on deposit, accounts receivable, etc., does not approximately equal the accounts payable and amounts due for interest and dividends and to other companies, it then means that the road is cramped for working capital. Another disturbing situation in current liabilities is to see the loans and bills payable mount up on one side of the balance sheet, and such items as advances to other companies increase in amount on the other side. This simply means that the company is going into debt for the purpose of helping out one or more of its branch lines or subsidiaries, which may or may not be a good thing. Also, if the accounts payable are increasing in greater ratio than the accounts receivable, or if the items such as "traffic balances due to other companies" are growing more rapidly than the amounts due from other companies, the situation also may be becoming complicated. And if, at any time, it is found that cash on hand is declining below the figures formerly shown over a reasonable period, it may mean that the road is getting tied up with a shortage of actual working capital.

Prior to the establishment of the Interstate Commerce Commission, it was the practice of many railroads, as in the case of many industrial companies to-

day, to give their stockholders no information whatever beyond that contained in a "condensed balance sheet." Thus, the only way the stock or bondholder was able to ascertain whether the company was making any progress or not, was to watch the changes from year to year in the "profit and loss surplus." It will be realized, in the light of what has been said in the preceding chapters, how very unsatisfactory such a practice was. The opportunities for deceiving the security holders were absolutely unlimited, for no figures whatever were given to indicate how the profit and loss surplus was created ;—whether the profits were the results of increasing business, curtailment of maintenance, income from outside operations, or mere manipulation of accounts.

Not all the railroads in those early days followed this practice of secrecy, but many important ones did. Until the early '90s, such important properties as the Lackawanna, New Jersey Central and the Lehigh Valley were still forcing their stockholders to accept "condensed balance sheets" as their only annual statement.

XXVIII

The Capital Assets

The largest item usually shown in the capital assets is the Property Investment account, formerly called "cost of road and equipment." This account is supposed to represent the actual capital invested in the road and its equipment. But, as a matter of fact, it does not in many cases represent anything of the kind. It has been customary in years past to charge to this account various items, such as discount on securities sold, special financing expenses, expenses for reorganizing the property, etc. As was pointed out by Mr. Woodlock, in his "Anatomy of a Railroad Report," published twenty years ago, a pronounced example of the peculiar construction of this account is represented by the record of the old Atchison, Topeka & Santa Fe road before the reorganization. The "cost of road and equipment" stood at \$95,755,207, but the expert audit of the books at the time of reorganization divulged the fact that over \$40,000,000 stood for nominal items, such as discount on bonds, etc., and that less than half of this great total really represented money spent on the property. The same facts could be demonstrated to more or less degree in connection with most of the railroad systems in this country at that time.

It will be realized, therefore, that the chief value attaching to the construction account figures is in the relative comparison of them from year to year. Most railroad reports present their balance sheet in comparison with the figures of the previous year, and with a series of reports the relative changes can be easily examined, showing the growth of this construction account and ascertaining just what the increase may represent. Most reports now furnish an itemized record each year of all expenditures which are charged to the property investment account and, of course, it is an easy matter to see where this new money comes from, whether borrowed through the sale of bonds or notes, whether charged to profit and loss, or whether secured by the sale of stock.

The item of "investments in securities and other properties" is in many cases of relatively great importance. Roads which, like the New York Central, the Pennsylvania or the Union Pacific, control a large number of subsidiary lines, depend, as we have already seen, to considerable extent on the income from these subsidiary lines. This income comes to them chiefly in the shape of dividends and interest on the securities owned, and there is a close relationship between the amount of other income of a railroad and the valuation of the securities owned as carried in the balance sheet of the company. Therefore, the importance of this particular item varies with the amount of outside interests the road under examination may happen to have.

It will often be found, on examination, that the "in-

vestments" carried in a balance sheet by a railroad are heavily overvalued, and that the income from these investments is purely nominal, or that there is no income at all. Of course, in such cases, the offsetting items on the liability side of the statement, such as the capital stock, will also have a greatly depreciated value. Cases in point are the statements of properties like the Wabash, the Missouri Pacific, etc. The stocks of these properties sell at heavily depreciated values, and this not wholly because of the inferior earning power of the roads themselves, but also because the earning power or income capacity back of many of the "treasury securities" is either very small, or because there is no income whatever.

The item of sinking funds is sometimes of great and sometimes of minor importance. Whatever entries of this kind a road may have should be clearly stated so that they may be readily understood, and so that it can be ascertained just what condition the fund may be in.

Nowadays not many railroad systems have sinking funds on their bonds, and those that still have such are usually carrying along unmatured issues which were created twenty-five or more years ago. The theory in the early days of railroad financing was that bond issues should gradually be retired through future earnings, but as, in later years, the growing earning power of the American railroads became more and more the basis of capitalization, the sinking fund idea was gradually abandoned. To-day, a "permanent debt" is regarded as the normal thing for the railroad

corporation, just as it has become in modern times the normal thing for governments to have permanent debts. This process results, of course, in capitalizing the earning power of future generations, a custom which has become a cardinal principle of all modern corporate enterprise. The wisdom of this custom is not to be discussed here; its existence is the fact to be **emphasized.**

XXIX

The Capital Liabilities

The capital liabilities consist chiefly of the stock and bond issues of the company. Of the former, there are not only issues of common and preferred stock outstanding, but very often we find such items as debenture stock, special equipment stock, special guaranteed stock, or betterment stock, and it has not infrequently been the case that a large railroad will assume the stock issue of a smaller company and carry it as a liability of its own, just as is done in the case of many bond issues. Bonds themselves are of many classes, and, as has already been stated in these pages, they carry numerous qualifying terms and are of many distinct types. In the case of practically all the larger systems we find that numerous bond issues, originally created by prior companies, or by companies which have been consolidated into the main corporation, are treated as direct obligations and carried along as part of the liabilities of the company.

If all railroad companies consisted of single corporations with no controlled lines, or if all the miles of railroad they owned were directly operated, the consideration of the balance sheet and other financial statements would be comparatively simple. In order to get a comparative

showing over a series of years, and form judgment of the relative position of the property with that of other railroad properties, we should simply need to reduce the figures to the ordinary mileage basis, as has been done in the examination of the other characteristics which go to make up the general report of the railroad. But in the great majority of cases, the investor immediately meets with a baffling problem as soon as he attempts to examine a railroad balance sheet intelligently. In addition to the records given, he finds that most railroads control by stock ownership, contract, lease or otherwise, important lines of road which they may or may not operate directly, and in connection with which they have certain obligations independent of the ordinary charges involved in their regular stock and bond issues. In other words, a large portion of the operated mileage of many a railroad system is made up of leased lines. Some of these lines are leased on a basis of a fixed rental per annum; some are leased on a basis of a proportion of net or gross receipts, and some are leased on a guaranty basis which may or may not change. An example is shown in the case of the Pennsylvania Railroad. The Pennsylvania Railroad Company reported in 1910, for its directly operated lines, 3,977 miles. Of this mileage, 2,099 miles are owned by the Pennsylvania Railroad actually, the remaining 1,878 miles being operated under lease or contract or used under trackage rights. Obviously the latter mileage should be included in the income account records, as it has been directly operated by the Pennsylvania Railroad. But the lines controlled by lease

are all separate corporations, with their own bonds and stocks outstanding, large portions of which are in the hands of the public and held as investments. These bond and stock issues, however, are not direct obligations of the Pennsylvania Railroad in the sense that its own bond and stock issues are obligations, and they, therefore, are not shown in the capital liabilities reported by the company in its balance sheet. Nevertheless, they cannot be ignored in an analysis of the railroad's position or results. The Pennsylvania Railroad has leased these properties on certain bases, in consideration of which it operates them, receiving into its own income account whatever profit it may be able to secure as a result of these operations. In consideration of having this right it pays out to the bond- and stock-holders of these leased properties certain fixed sums previously agreed upon, which take the nature of guaranties on stocks and bonds. These guaranties, or rental items, are on all kinds of bases, most of them having been arranged at different periods and as results of different circumstances. Thus we find that many leased lines are controlled through the guaranty by the parent company of the interest and principal of the bond issues alone; others are controlled through the guaranty of certain dividends on stocks as well as the interest on the bonds, while still others are controlled through guaranty of specific amounts which are used by the rented property for meeting current obligations of interest and dividends. In the case of the Pennsylvania Railroad, the rental charges against its general income amounted in 1910 to \$7,652,272, so that

it will be seen that in this instance the item of rentals is practically as important a part of the fixed charges as is the interest on its own direct bonded debt.

As this item of rentals in the operating results of railroads is such an important factor, it will be realized that unless it is in some way taken into consideration in the examination of the balance sheet of the company, it would not be possible to make any analysis of the balance sheet in an intelligent way. In other words, were we to examine the totals shown in the capital items of the balance sheet alone, and then examine the net income results to see what percentage of net income or, in fact, of gross income, or any other income, were shown on the capital of the road, we should get very grotesque results if we did not in some way consider the fact that the rented properties themselves have stocks and bonds on which interest and dividends must be paid.

If we examine the income and capitalization record of the Lackawanna, the relative importance of considering the rental items in connection with the balance sheet will be seen. The Lackawanna itself now has only a nominal bonded debt. Its fixed charges, however, have averaged during the past ten years more than \$8,600 per mile, far more than 80 per cent of these charges having been made up of rental items on leased-line securities. These items have been of various kinds; some guaranties on bond issues, many on stock issues. The outstanding capital of the Lackawanna in 1910, as reduced to the mileage bases of the operated system, was about \$37,000 per mile. The amount of investments

owned by the company, as shown in its balance sheet, was about \$33,700 per mile. Now, if we considered no other capital items and disregarded the securities of leased lines, not shown in the balance sheet, we should have a net capital per mile for the Lackawanna system of only \$3,300. As the road earned in gross in 1910 over \$44,000 per mile, this would mean that it was each year earning far more than ten times its net capital, and as its total net income was \$25,000 per mile, it would imply that the net income of the system at the present time was equivalent to 700 per cent on the capital outstanding. The absurdity of this conclusion is apparent, but nevertheless, it would be a logical deduction from the figures given in the balance sheet and income account, with the securities of the rented properties disregarded.

The item, "Other permanent loans, notes etc.," as shown in the list of capital liabilities on page 182, embraces generally such items as short term notes, special advances from bankers, etc., which the railroad has been obliged to secure for some capital use. It might be assumed that such items should be included in "floating debt" and sometimes this is the correct thing to do. But as a rule, the short term notes should be included in the permanent capital liability account, for in practically all cases, short term obligations of railroads are sooner or later converted into, or exchanged for, some fixed bond obligation. The short term note issue is usually resorted to by the railroad in times of poor investment demand, when it is difficult to dispose of a long term bond at a fair price. It

is generally expected that before the maturity of these notes investment conditions will improve to the extent of enabling the corporation to float some fixed obligation, or to issue additional capital stock.

The equipment trust, the principal of which is, theoretically, to be paid out of earnings, is, as a matter of fact, in numerous cases finally retired by the issue of bonds or stock. This is an unsound practice, and should never be resorted to, for in the course of time the earning power of equipment declines and finally vanishes, and when that time has arrived, and the equipment is relatively worthless, there should certainly be existing no capital obligation against it.

Not all the railroads follow this bad practice, but in recent years a considerable number have been guilty of it to a more or less degree. Where this is done on any large scale, the investor should regard it as a distinct danger signal.

Capitalization of Rentals

The problem of analyzing the capital items of leased lines in a manner for admitting of ready comparison, has been a difficult one. As the term of leases, both in length of time and in amount of rental, are so varied and as the figures given in different reports regarding these terms and payments are so incomplete, some arbitrary method must necessarily be adopted for reducing them to a comparative basis. In the case of some companies all the different rental items are separately stated, and it is a very simple matter to ascertain their amount and treat them accordingly. But this is not the case in most instances and, therefore, in making comparisons of the capital factors, the uniform policy should be adopted of capitalizing the rental obligations of the operating companies at 5 per cent. An approximate estimate of a large number of rental obligations indicates that 5 per cent is a fair and conservative basis for a purpose of this kind, and it is believed it approaches the actual condition more closely than a lower percentage would. Examinations of instances where the items are furnished in reports will show that the 5-per-cent basis is in no case very far out of the way.

It might be contended by some that a more accurate method for capitalizing the rentals in a comparative analysis would be to simply add up the stocks and bonds of the rented properties, and reduce them to the mileage basis and include them in a table. But in many cases this would be most illogical and misleading. The different leased lines which the operating companies control have usually been acquired on a basis which has disregarded the par value of their own capitalization, and has been arrived at more or less on a basis of earning power. Thus, it is found that in many cases a leased line may have been acquired through a guaranty of its bond issues only, thus leaving the stock issue of that leased line without dividends and without hope of any return as long as the lease is in operation. Obviously, in this case, the stock of the leased line, receiving no return whatever, and not having any control of the property during the life of the lease, will be worth a nominal sum only. On the other hand, there are many cases where a line has been considered of so much value to the leasing company that the latter has guaranteed some high rate of dividend, such as 10 per cent or 15 per cent on the capital of the leased road for a long series of years. In such an instance the value of the stock of that property will naturally be far higher than its par value as measured by income return, which will mean that the capital obligation on the leased line, for which the parent company is responsible, may be in effect far higher than the par value of the securities of the leased line. So we find that here, as everywhere

else in the railroad report, the true valuations are based on earning capacity and income results, rather than on the mere nominal amounts given in the face values of the stocks and bonds.

To return again to our illustration of the Lackawanna capital showing. The Lackawanna operated in 1910 815 miles of road, including the mileage of the leased lines, all of which have their own bonds and stocks outstanding, and on which in most cases the Lackawanna road has made certain guaranties. The figures of gross and net income included in the income account are the results of operation on these 815 miles of road. Therefore, we must find the obligation of the Lackawanna Company in some way in the financial statement or balance sheet, which will give a proper idea of the actual liabilities in capital items of the Lackawanna Railroad. By capitalizing on a basis of 5 per cent all the rentals for which the Lackawanna is responsible, we find that as reduced to the mileage basis of the operated system, the Lackawanna rentals (as thus capitalized) amount to about \$126,600 per mile. We have already shown that the other capital items of the Lackawanna amounted, after the deduction of the investments of the company, to \$3,300 per mile, thus giving as an approximate net capitalization for the railroad system, a figure of about \$130,000 per mile.*

* This method of capitalizing the rentals at 5 per cent, adding this capitalized liability to the other capital liabilities in the balance sheet, and treating this as the gross capital of the company, has been followed in "Moody's Analyses." To arrive at a net figure the investments of the company have been deducted from the gross capital, the balance remaining being approximately the amount of capital value on which the railroad must make a net income return. An examination of the Analyses in the volume

There are, of course, many instances where properties have no rental items whatever which can be capitalized, or which should be included in the general capitalization figures. Rentals of tracks, terminal facilities, buildings, etc., are distinct from the ordinary class of rental obligations. Like the rental of equipment, such items as these are of a very fluctuating nature and while one year they may amount to a considerable sum, another year they may be only nominal. But where a branch line is held by a long term lease, and the rental compensation is more or less fixed throughout a long series of years, then the only thing to do with such a charge is to capitalize it as a part of the gross capitalization of the company.

will show the great differences in the classes of capital figures. It will show that in many cases the rentals are merely nominal and do not affect the general result at all, while in other instances they are by far the most important factor.

XXXI

Stocks and Bonds Outstanding Per Mile

Like the earnings figures of the railroads, there is vast variation in the amounts of capital outstanding on the different systems. This fact is naturally brought to light more definitely by a consideration of the figures on the mileage basis. As so reduced, many remarkable facts of variation are brought definitely into view. Stock outstanding per mile varies on different roads all the way from \$5,000 up to more than \$100,000 per mile, but as already pointed out, the amount per mile really has no relation to the question of "over-capitalization" *per se*. A railroad with stock outstanding at the rate of \$10,000 per mile may easily be far more heavily "over-capitalized" than one with stock outstanding of \$50,000 per mile—assuming, of course, that we measure value on the income-producing basis, which really is the way in which it is measured. For example, the Wisconsin Central, with stock outstanding at the rate of \$27,000 per mile, is far more heavily capitalized, as measured by income results, than the Reading Company with stock outstanding at the rate of \$140,000 per mile.

A comparison of the stocks outstanding per mile on the different roads during a series of years is

chiefly valuable in showing the changes from year to year and also in showing the relative amounts of bonds and stocks as well as the proportion of stock to the entire net capital of the road. It is interesting to note that the position of many properties has undergone pronounced change in this respect during the past ten years. The Atlantic Coast Line, for example, reported in 1901 a total capitalization made up to the extent of 60 per cent in stock issues. During the years following the stock issues declined in amount, not only in relation to the mileage operated, but also in relation to the total capital liabilities of the road, and in 1908 the stock outstanding represented but 23 per cent of the total amount of stocks and bonds. Often we find that the decline in the stock issues is offset in direct ratio by increase in the bond issues. At other times the offsetting increase is in rental charges or in declines in the amounts of securities held in the balance sheet. Conversely, where the stock outstanding has increased in pronounced proportion, a relative change of some kind, resulting in at least a partial offset, is shown in the decline in the bond obligations, or in the rentals, or possibly in an increase in the amounts of securities owned.

It will be seen that a healthy trend in this comparative capitalization showing is naturally characterized by a declining percentage in the bonds outstanding. If the bond issues are declining in amount per mile, it means that the fixed charges are also declining, unless, of course, the rental items are growing. It

is much better, for the railroad's position and credit, to issue non-interest-bearing obligations if it can, and generally speaking those roads which have made their extensions and carried on their developments during recent years through the issue of capital stock are in much better position than those which have uniformly followed the policy of issuing bonds. This ruling does not always hold, but is sound as a general proposition.

There are two conditions under which a railroad may be justified at a given time in issuing bonds for improvements and extensions rather than stocks. One of these is in the case of those properties the earning power of which has not reached a point where good dividends are being earned on the stocks, and where the latter are selling at depreciated values. The only way the road can raise money is by the issue of bonds, and it must either do the latter or not spend any money at all. The other situation is where a road of high credit can, in times of easy money, put out a long-term obligation at a low rate of interest. Instances of the latter have been reflected in the policy of the Illinois Central in years gone by, and also more recently by the Pennsylvania.

As a general proposition, however, it is much better for a railroad to issue stock if it can. In the past few years the St. Paul, the Chicago & North Western, and the Canadian Pacific have adopted this policy with most satisfactory results. The Canadian Pacific, for example, increased its stock outstanding from \$12,850

per mile in 1898, to \$20,192 per mile in 1908, its bonds outstanding at the same time declining per mile about 10 per cent, and its rentals changing but nominally. The net result of this policy has been that the fixed charges are now no more per mile than they were ten years ago, and the road has been finding it easier to pay 10 per cent on its common stock in recent years, than it did to pay 4 per cent on this stock in 1899. The credit of the company is in every sense stronger, and as its bond issues now represent only about 45 per cent of its total gross capital as compared with 58 per cent ten years ago, it will be realized that, as a whole, the equity in the property which is owned by the stockholders has very greatly increased.

In making comparisons of this kind the total amounts outstanding should be included for each year. Among the bond issues should be included in all cases such items as equipment trust obligations, loans on realty or on other property, short-term note issues, etc. During the past few years, the railroads have, in many cases, issued notes running from two to five years, which while not mortgages, and in a sense temporary obligations, will in all cases be sooner or later replaced by permanent capital obligations of one kind or another. Therefore, they should be treated as capital, rather than current obligations, in any relative consideration of the financial condition of the company. In making comparison with other properties it must be remembered that the same conditions for comparison which

apply to the Physical and Income Factors, do not necessarily apply to the Capital Factors of a railroad. In examining the "capital factors", we are specially interested in ascertaining the relationship between the net value of the capital (which means the worth of the property) to the earning power shown. It is therefore an easy matter to compare the capital figures of the Union Pacific with the Pennsylvania, or of the Louisville & Nashville with the New Haven. By ascertaining the percentage of net income shown on net capital, we can see relatively whether the New Haven property is doing better or has done better on its average net capital over a period than has the Louisville & Nashville on its own average net capital. We can in this way judge as to the relative financial strength and condition and general standing of both of the companies.

Thus we can compare the capital figures one with another as a whole. But we can also compare the individual items. A comparison of the bond liabilities on the New Haven property with the bond liabilities on the Union Pacific property, will bring into prominence certain striking differences. While the Union Pacific bonded debt has shown, in the face of great growth in volume of business during the ten years, a declining tendency, the bonded debt in the New Haven shows, in the face of only a moderate growth in business, an increase of about 800 per cent as measured on the mileage basis. This simply means that while the Union Pacific has decreased its charges per mile, and increased its margin of safety very heavily, the New Haven has

increased its fixed charges enormously, and that although its growing business has held up the margin of safety on its bond issues to some extent, the margin on its stock issue has been greatly reduced in the past few years. An investor in the stocks of either of these companies would naturally reach the conclusion that, on the showing here made, the Union Pacific is clearly more certain of paying its dividend of 10 per cent per annum than is the New Haven of continuing its 8-per-cent rate. All things considered, the Union Pacific common stock at \$160 per share, therefore, looks far more attractive to the investor than the New Haven stock at the present price of \$136 per share.

The analyses of the bond issues of the different systems are somewhat difficult to make. In many cases issues have been assumed on branch lines which have been consolidated with the main company, and on which interest may have been guaranteed. Where a bond issue has been guaranteed on a separately operated property, which is not leased, the amount should be included in the bond debt and not among the rentals. This would be the case with the New Haven, where, in the past few years, many acquisitions have been made in properties outside of the leased lines and the railroad system itself. Many of these bond issues have been assumed and guaranteed, but the properties have not been leased in the ordinary sense.

Sufficient has already been said regarding the rentals and the plan for capitalizing them at 5 per cent, and it will not be necessary to make further extended

comment here. Railroad reports show many interesting changes in these figures from year to year. Most of the older roads in the Eastern States, and some in the Southern States, have very important rental obligations, while on roads west of Chicago and Cincinnati the rental items are usually of a nominal nature. The New Haven, the New York Central, Pennsylvania, the Reading, and the Erie, all report extremely heavy rental liabilities, while roads like the St. Paul, Atchafson, Union Pacific, and Great Northern have practically no rental obligations whatever.

XXXII

Net Capitalization

As already pointed out, the only practical method for getting at an approximate figure for showing the true capitalized value of the railroad, is to take into consideration the investments or securities owned which are reported by the company in its balance sheet. Sometimes these securities owned consist of stocks and bonds of the system itself; sometimes they consist of issues of branches or leased lines, while in other instances they may consist of securities of roads which are entirely independent. Securities held by railroad companies represent various conditions. On the Pennsylvania Railroad we find that its securities owned run into very large sums and that the return in interest and dividends on these securities is a very important factor in the income account. It is frequently the case that a railroad company will own all, or nearly all, of the bonds or stocks of a leased or controlled line, and will receive the income produced by its own guaranty on the securities which it owns. In such case the item must of course appear on both sides of the statement, and where a lease has been capitalized at 5 per cent, it may be that a portion of this capitalized item is offset by items in securities

owned. This, however, does not change the net result.

While the policy of investing in securities was begun by the railroads for the purpose of acquiring or controlling branches and feeders, this policy has in recent years enlarged to a vast extent, and we now find great railroad systems owning securities of other railroad properties which seem in no way, in a traffic sense, to have any real relationship. Thus we find that the Union Pacific has virtual control of the Baltimore & Ohio system, enabling it, with the Lake Shore interests, to control the Reading Company and the Central Railroad of New Jersey. The Union Pacific also has heavy interests in the New York Central property, in the St. Paul, and in the Chicago and North Western. These investments have been acquired for other purposes than that of merely producing income, and this latter fact and the relative worth to the road as a whole, must be taken into consideration when we examine the securities owned in connection with the amounts of other income of the roads.

The "net capitalization" of a railroad property can always be ascertained by the following simple method. First, add together the amount of stocks, bonds, notes, equipment trusts, floating obligations, etc., which are outstanding. Then turn to the income account and ascertain the amount of money paid out, as a part of the fixed charges, for rentals of leased lines. These rentals may be in the shape of dividends

guaranteed on leased line stocks, interest guaranteed on leased line bonds, or simple payments of money as "rental." Sometimes lines are leased on a percentage of gross or net earnings of the leased line itself. In this case the item will appear in the fixed charge as "rental" for such and such a line. Having ascertained the total amount of rental payments for the given year, capitalize this sum at 5 per cent (that is, multiply the total by 20), and then add the result to the total direct capital, as represented by the amount of outstanding stocks and bonds of the main system. The aggregate will give the gross capitalization of the railroad.

Then turn to the asset side of the balance sheet and ascertain the amount of the security investments reported by the company. This may be in one item or it may be in several. Whatever the amount is, deduct it from the gross capitalization already ascertained, and the balance remaining over will give the Net Capitalization of the property.

To give a concrete illustration of the process, let us take the balance sheet of the Denver & Rio Grande for the fiscal year 1911. The total stock and bonded outstanding were \$205,610,800. The company reported no separate rentals of leased lines, for although it guarantees interest on certain bonds, these bonds are included in the debt of the company itself. It did, however, report \$29,520,473 of securities held as investments, and this amount should be deducted from

the gross capital, thus giving the net capital of the company as \$176,090,227.

For comparative purposes, this net capital, with the different items comprising it, can be reduced to the mileage basis of the system, and when this is done, the percentage of net income per mile, as explained in the following chapter, can at once be ascertained.

XXXIII

Net Income on Net Capital

The net capital of a railroad furnishes us with the approximate worth of the property, and enables us to compare this approximate worth with the earning capacity shown. Thus we have a method at hand whereby we can at a glance ascertain whether, in face value, the railroad is or is not over-capitalized. By comparing the net income per annum with the approximate net capital, we get a distinct view of the financial standing and strength of the property. If its net income on this net capital is above the average return and in the record shows an improving trend, we know at once that the financial strength of the property is favorable. On the other hand, if we find a declining tendency present or find that the percentage on the net capital is abnormally low, then it simply means that the road is over-capitalized, as measured by the par value; that its resources are small, and that its earning power, from the standpoint of the security-owners, is relatively weak. Comparison of this figure with the Margin of Safety, (already discussed in a previous chapter), gives at a glance the general key to the condition of the entire property. The Margin of Safety enables the bondholder to know

the position of the bonds in the income-producing capacity, as far as his interest is concerned, while the Net Income on Net Capital is of vital interest to every security-holder, whether he is in the position of a bondholder or stockholder.

Many of the railroads in the United States present remarkable records in growth of earning power during the past ten years, and in the face of large increases in capital obligations have shown a steady expansion of the percentage of net income on the net capital for many years. Other roads, on which the net capital has declined, as measured on the mileage basis, have of course shown a larger percentage of net income on this smaller net capital without having materially increased their total net income. The Central of Georgia reported for the decade ending with 1908 a decline in its net capital per mile from \$35,283 to \$28,295. In the first year the total net income equalled 4.4 per cent on its capital, while in 1908 it reported 6.1 per cent. Yet in 1908 the total net income per mile was \$1,723 in comparison with \$1,458 in 1899, an increase of only about 20 per cent. But because of the reduction in the net capital outstanding, the road was, of course, in a much stronger financial position in the latter year than in the former.

Most of the American railroads present during the past decade an excellent record in their capitalization figures, as they do in income-producing comparisons. Only a small number have shown an inability to keep their Capital Factors in proper relation to income re-

sults, and while during the decade vast issues of securities have been created by all the progressive systems, and in many cases the capital liabilities have doubled or more than doubled, yet there are but few instances where these increases have grown faster than the relative growth in earning power.

The railroads which are in the weakest position in their capital factors are naturally properties of the type of the Detroit, Toledo & Ironton, which began their career with exceedingly heavy capital items, and therefore have been handicapped in their operating efforts from the start. The Detroit, Toledo & Ironton reported a net capital, in 1908, of about \$88,000 per mile, on which it earned little more than 1 per cent. This capitalization was double that of the Lake Erie & Western, and 40 per cent higher than that of the Wabash, and while, if the road had had a capital not higher than that of the Lake Erie & Western, it might have made a very fair showing in recent years, with the enormously heavy load to carry which these figures reflect, it had no opportunity at all of getting on its feet. As its income record shows it has never earned a surplus, and during the past five years has regularly reported a heavy deficit under its charges.

Properties like the Erie, which carry enormously heavy capitalizations, must, as a rule, show a comparatively high return on their capital to maintain good credit and present a satisfactory record. Examination of the Erie reports will show the load which the Erie is obliged to carry in the matter of capitalization.

In 1899 its net capital was at the high figure of \$117,318 per mile, of which \$66,580 was represented by bond obligations and \$13,700 by rentals, all these items carrying definite fixed charges. Its securities owned in that year, while carried at a valuation of \$44,000 per mile, were worth far less than this, as the other income is shown to have been but \$300 per mile that year. During the ten years which succeeded, the net capital of the Erie increased to \$146,741, but the proportion of stocks and bonds radically changed, the bonds outstanding growing to \$108,562 per mile, while the rentals moderately declined. The securities owned in 1908 amounted to \$52,000 per mile, but were apparently not worth this in income-producing power to the road, as the other income was still of a comparatively nominal amount. Therefore, it will be seen that the fixed obligations of the company had increased far more per mile than the net capital had grown, and when a setback came in earnings in 1908, the company was in no position even to meet its fixed charges, the latter having grown nearly 50 per cent beyond the figures of 1899.

APPENDIX

Outline of the Uniform Accounting Requirements for Operations of Steam Railroads, as Prescribed by the Interstate Commerce Commission

Classification of Operating Revenues :

- A. Revenue from Transportation.* This classification includes the following: 1. Freight Revenue. 2. Passenger Revenue. 3. Excess Baggage Revenue. 4. Parlor and Chair Car Revenue. 5. Mail Revenue. 6. Express Revenue. 7. Milk Revenue (on passenger trains). 8. Other Passenger Train Revenue. 9. Switching Revenue. 10. Special Service Train Revenue. 11. Miscellaneous Transportation Revenue.
- B. Revenue from Operations Other Than Transportation.* This classification includes the following: 1. Station and Train Privileges. 2. Parcel Room Receipts. 3. Storage—Freight. 4. Storage—Passenger. 5. Car Service. 6. Telegraph and Telephone Service. 7. Rents of Buildings and Other Property. 8. Miscellaneous. 9. Joint Facilities Revenue—Dr. 10. Joint Facilities Revenue—Cr.

Classification of Operating Expenses :

- A. Maintenance of Way and Structures.* This classification includes the following: 1. Superintendence. 2. Ballast. 3. Ties. 4. Rails. 5. Other Track Material. 6. Maintenance of Roadway and Track. 7. Removal of Snow, Sand and Ice. 8. Tunnels. 9. Bridges, Trestles and Cul-

verts. 10. Over and Under Grade Crossings. 11. Grade Crossings, Fences, Cattle Guards and Signs. 12. Snow and Sand Fences and Snow Sheds. 13. Signals and Interlocking Plants. 14. Telegraph and Telephone Lines. 15. Electric Power Transmission. 16. Buildings, Fixtures and Grounds. 17. Docks and Wharves. 18. Roadway Tools and Supplies. 19. Injuries to Persons. 20. Stationery and Printing. 21. Other Expenses. 22. Maintaining Joint Tracks, Yards and Other Facilities—Dr. 23. Maintaining Joint Tracks, Yards and Other Facilities—Cr.

B. Maintenance of Equipment. This classification includes the following accounts: 1. Superintendence. 2. Steam Locomotives—Repairs. 3. Steam Locomotives—Renewals. 4. Steam Locomotives—Depreciation. 5. Electric Locomotives—Repairs. 6. Electric Locomotives—Renewals. 7. Electric Locomotives—Depreciation. 8. Passenger Train Cars—Repairs. 9. Passenger Train Cars—Renewals. 10. Passenger Train Cars—Depreciation. 11. Freight Train Cars—Repairs. 12. Freight Train Cars—Renewals. 13. Freight Train Cars—Depreciation. 14. Electric Equipment of Cars—Repairs. 15. Electric Equipment of Cars—Renewals. 16. Electric Equipment of Cars—Depreciation. 17. Floating Equipment—Repairs. 18. Floating Equipment—Renewals. 19. Floating Equipment—Depreciation. 20. Work Equipment—Repairs. 21. Work Equipment—Renewals. 22. Work Equipment—Depreciation. 23. Shop Machinery and Tools. 24. Power Plant Equipment. 25. Injuries to Persons. 25. Stationery and Printing. 26. Other Expenses. 27. Maintaining Joint Equipment at Terminals—Dr. 28. Maintaining Joint Equipment at Terminals—Cr.

C. Traffic Expenses. This classification includes: 1. Superintendence. 2. Outside Agencies. 3. Advertising. 4. Traffic Associations. 5. Fast Freight Organizations. 6. Industrial and Immigration Bureaus. 7. Stationery and Printing. 8. Miscellaneous Expenses.

D. Transportation Expenses. This classification includes: 1. Superintendence. 2. Dispatching Trains. 3. Station Employees. 4. Weighing and Car Service Associations. 5. **Coal and Ore Docks.** 6. Station Supplies and Expenses. 7. Yardmasters and their Clerks. 8. Yard Conductors and Brakemen. 9. Yard Switch and Signal Tenders. 10. Yard Supplies and Expenses. 11. Yard Enginemen. 12. Engine-

house Expenses—Yard. 13. Fuel for Yard Locomotives. 14. Water for Yard Locomotives. 15. Lubricants for Yard Locomotives. 16. Other Supplies for Yard Locomotives. 17. Operating Joint Yards and Terminals. 18. Operating Joint Yards and Terminals—Cr. 19. Motormen. 20. Road Enginemen. 21. Enginehouse Expenses—Road. 22. Fuel for Road Locomotives. 23. Water for Road Locomotives. 24. Lubricants for Road Locomotives. 25. Other Supplies for Road Locomotives. 26. Operating Power Plants. 27. Purchased Power. 28. Road Trainsmen. 29. Train Supplies and Expenses. 30. Interlockers and Block and Other Signals. 31. Crossing Flagmen and Gate-men. 32. Drawbridge Operations. 33. Clearing Wrecks. 34. Telegraph and Telephone—Operation. 35. Operating Floating Equipment. 36. Express Service. 37. Stationery and Printing. 38. Other Expenses. 39. Loss and Damage—Baggage. 40. Damage to Property. 41. Damage to Stock on Right of Way. 42. Injuries to Persons. 43. Operating Joint Tracks and Facilities—Dr. 44. Operating Joint Tracks and Facilities—Cr.

E. General Expenses. This classification includes the following accounts: 1. Salaries and Expenses of General Officers. 2. Salaries and Expenses of Clerks and Attendants. 3. General Office Supplies and Expenses. 4. Law Expenses. 5. Insurance. 6. Relief Department Expenses. 7. Pensions. 8. Stationery and Printing. 9. Other Expenses. 10. General Administration Joint Tracks, Yards and Terminals—Dr. 11. General Administration Joint Tracks, Yards and Terminals—Cr.

Classification of Revenues and Expenses for Outside Operations:

Outside Operations embrace the following accounts: 1. Boat Lines. 2. Ferry Lines. 3. Harbor Terminal Transfers. 4. Electric Railways. 5. Express Lines. 6. Cab and Omnibus Service. 7. Sleeping Car Service. 8. Parlor and Chair Car Service. 9. Dining and Special Car Service. 10. Electric Light and Power Plants. 11. Gas Producing Plants. 12. Canals. 13. Grain Elevators. 14. Stock Yards. 15. Commercial Telephone and Telegraph Lines. 16. Hotels and Restaurants. 17. Amusement Parks and Resorts. 18. Coal Storage Plants. 19. Cold Storage Plants. 20. Commercial Ice Supply Plants. 21. Public Toll Bridge Service. 22. Miscellaneous.

Classification of Expenditures for Construction of Road and Equipment:

- A. Road.* This classification embraces the following accounts: 1. Engineering. 2. Right of Way and Station Grounds. 3. Real Estate. 4. Grading. 5. Tunnels. 6. Bridges, Trestles and Culverts. 7. Ties. 8. Rails. 9. Frogs and Switches. 10. Track Fastenings and Other Materials. 11. Ballast. 12. Track Laying and Surfacing. 13. Roadway Tools. 14. Fencing Right of Way. 15. Crossings and Signs. 16. Interlocking and other Signal Apparatus. 17. Telegraph and Telephone Lines. 18. Station Buildings and Fixtures. 19. General Office Buildings and Fixtures. 20. Shops, Engine Houses and Turntables. 21. Shop Machinery and Tools. 22. Water Stations. 23. Fuel Stations. 24. Grain Elevators. 25. Storage Warehouses. 26. Dock and Wharf Property. 27. Electric Light Plants. 28. Electric Power Plants. 29. Electric Power Transmission. 30. Gas-Producing Plants. 31. Miscellaneous Structures. 32. Transportation of Men and Material. 33. Rent of Equipment. 34. Repairs of Equipment. 35. Earnings and Operating Expenses during Construction. 36. Injuries to Persons. 37. Cost of Road Purchased.
- B. Equipment.* This classification embraces the following accounts: 1. Steam Locomotives. 2. Electric Locomotives. 3. Passenger Train Cars. 4. Freight Train Cars. 5. Work Equipment. 6. Floating Equipment.
- C. General Expenditures.* This classification embraces the following accounts: 1. Law Expenses. 2. Stationery and Printing. 3. Insurance. 4. Taxes. 5. Interest and Commissions. 6. Other Expenditures.

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The foregoing method is applied to every railroad system analyzed, and forms a complete ten-year detailed view of the changes in the property in a physical and operating sense.

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A Ten-year record is next presented of the BALANCE SHEETS of each railroad system, reduced to

a mileage basis. This exhibit shows the Stocks

and Bonds Outstanding, the amount of Rental Obligations (capitalized at 5%), amounts of Securities or Investments owned, the Net Capitalization of each road, and the Percentage of Net Income on Net Capital. A Dividend Record is also presented in this Table, and all figures cover the full period of ten years. Averages of the Ten-year figures are shown, and comparisons made with four other properties, as in the case of the other tables. Finally, analytical comments are made by the author on the entire exhibit, pointing out the strong or weak features on the financial side of the property.

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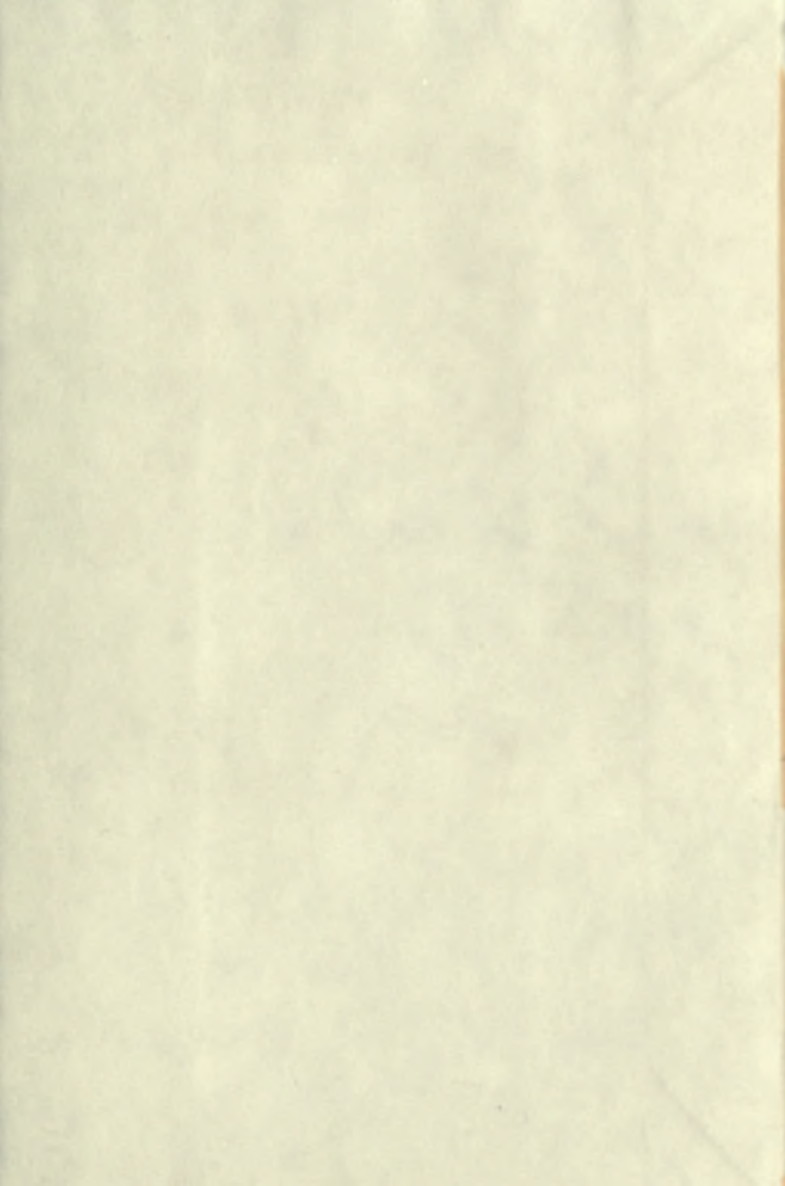
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